Advance Schneider Cup Issue

AVIATION

The Oldest American Aeronautical Magazine

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One of the American Schneider Cup Racers in a Test Flight

VOLUME XXI

NUMBER 19

SPECIAL FEATURES

THE GREAT INTERNATIONAL SEAPLANE CLASSIC
THE PROTECTION OF DURALUMIN FROM CORROSION
THE PITCAIRN SESQUI-WING

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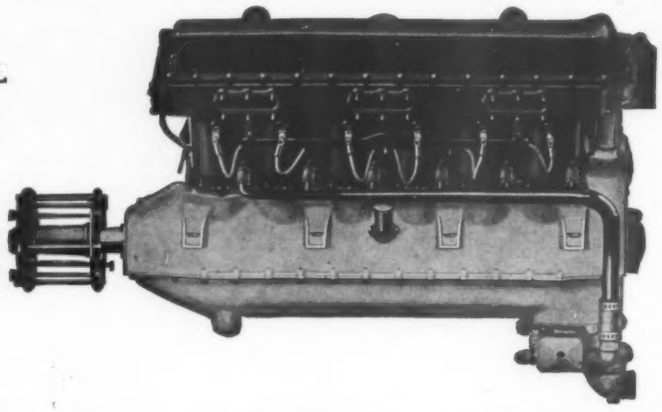

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NOVEMBER 8, 1926

AVIATION

VOL. XXI. NO. 19

Published every Monday

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IN 1923 A CURTISS RACING SEAPLANE WITH A CURTISS MOTOR WON THE SCHNEIDER CUP RACE AT COWES ENGLAND AND THUS BROUGHT THIS COVETED TROPHY TO THE UNITED STATES.

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The Future of the Schneider Cup

THE NINTH contest for international seaplane speed honors in the Jacques Schneider Cup race is about to be held at Norfolk, Va. It will be the second time that the race for this much prized trophy will have been held in the United States and there is every indication of the coming contest proving the most interesting from every standpoint that has ever been held. In the first place, enthusiasm appears to increase in proportion to the speeds at which the race is won each year and this interest is further stimulated by frequent conjecture as to what really is the ultimate speed limit beyond which human endurance or engineering ability cannot go. In this year's race, however, not only is the winning of the Trophy an issue, but the permanent possession of the Schneider Cup is at stake.

According to the rules of the contest laid down by the donor way back in 1913, the country which first wins the cup three times within five years may claim its permanent possession. America won the Cup in 1923 and again in 1925, so that if this country again claims the honors this year, the Schneider Cup will automatically pass into the permanent possession of the United States. While Italy, too, has won the cup twice before, namely in the years 1920 and 1921, a win again this year will, obviously, not give her three successes within the past five years so that whether or not there will be a Schneider Cup race in 1927 is one of the questions that cannot be answered until after the race on November 11.

This point raises a very interesting and important question. There is no doubt that contests such as this one do a tremendous amount of good in fostering aeronautical development, especially when they are, as is the Schneider Cup race, international in scope. Furthermore, such contests encourage the international sport of aviation, a cause which can only claim the endorsement of the entire World aeronautical community. What, then, is going to happen should the United States win the Schneider Cup this year, thus, according to the present conditions of the contest, ending the competitive history of this almost legendary event in the great international sport of air racing? Perhaps some wealthy sportsman and benefactor of aviation will come forward with a trophy and prize money—and the latter is very important in order to make it worth while for serious contestants to compete—to replace the Schneider Cup and thus continue to encourage aeronautical development, and, what is also important, foster the real sporting spirit in aviation, which has been inclined to wane since the pioneer days of flying.

Nevertheless, excellent though the putting up of such a new trophy might be, it is difficult not to feel excessive disappointment at the possibility of the passing of the original Schneider Cup, with all its clinging sentiments, from the realms of sporting aviation. In no way can a new trophy, no matter how abundantly endowed or heavily embossed, conjure up the old remembrances and enthusiasms of the great pioneers of aviation. Never can a 1927 air race trophy, no matter how resplendant in its grandeur, be the equivalent prize of a Schneider Cup which was first captured at 45 m.p.h. and is now won at 250 m.p.h.

No one can conjecture on the result of the coming race. Our Italian visitors may well carry the much prized seaplane trophy back with them to Italy when it will be up again for competition next year and perhaps after. The United States, however, has an equally good chance at Norfolk this week and may claim the full honors, taking with them the permanent possession of the Cup. In such an event, does it not seem that a most graceful act might be performed by the United States Navy in putting the Schneider Cup itself back into international competition, amending such rules as may be found necessary, in order that the time-honored sentiments of the sport of aviation may be preserved?

It should be added, perhaps, that if such a suggestion were followed, it would in no way relieve the aforementioned wealthy sportsmen and benefactors of aviation of their munificent obligations.

Passing Thoughts on the Coming Race

IN A few days after this appears in print, the highest aeronautical engineering ability of Italy will be matched against that of the United States in the contest for World seaplane speed honors and the Schneider Cup trophy. In the days before the War when this almost historic trophy was first raced for, there was little difference to be found between a racing airplane and any other class of machine. Since those pioneer days, however, aeronautical engineering has become far more specialized and today an ordinary airplane is by no means a speed machine in the modern meaning. While there is of necessity a great deal of overlap in the design problems of all classes of airplanes, each involves questions of specialized nature demanding experience if maximum success is to be expected. It will be recalled that Glenn H. Curtiss, the famous American pioneer and founder of the Curtiss organization, won the first airplane race in history, the Gordon Bennett Cup, back in 1909. It is not really surprising, therefore, to find Curtiss airplanes still representing the United States in the international race for supremacy in seaplane speed. Glenn Curtiss won the Gordon Bennett Cup in 1909 at 43 m.p.h. After the contest, opinion was expressed that 100 m.p.h. would be the ultimate speed limit. Today there seems little doubt that speed racers will soon be flown at 300 m.p.h. and over.

On Nov. 11, at Norfolk, Va., all the elements of experience and the most expert piloting ability will be thrown into the balance to weigh Italy against America for the 1926 seaplane speed honors. The result will attract almost world-wide interest.

The Schneider Cup Race

Three Speed Monoplanes to Represent Italy in International Contest. Curtiss 700 hp. Racers in American Team.

THREE DAYS after this issue of AVIATION appears, the representative teams of Italy and the United States will be gathered together at Norfolk, Va. to contest the seaplane speed honors of the World in the race for the historic Jacques Schneider Cup which is now held by the United States. The race is to be held over a triangular course of 350 km. extending from the southern end of Newport News wharf to the northern end of the Naval Operating Base, Hampton Roads (10.073 km.), then Northeast to a point 15.906 km. away to be marked especially for the race and back in a southwesterly direction to Newport News wharf (24.021 km.) Thus, the total course is 50 km. long and there will be seven laps.

The race itself will be preceded by the eliminating trials on Nov. 10, which will start with a navigability test followed by a watertightness test, both these tests being for the purpose of establishing the seaworthiness of the seaplanes entered and for preventing the entry of freak machines. Each plane must fly a distance of from 5 to 10 miles over the sea after which each pilot will be required to taxi his plane at a minimum speed of 12 knots over two distances of one-half a nautical mile. In the event of a failure to carry out the full requirements of this test a pilot will be permitted to try once again in a final test. This navigability and flying test will be followed immediately by the watertightness and seaworthiness tests. The machines will, upon completion of the flight test be moored to buoys where they must remain for a period of six hours without any attention or anyone on board. No repairs will be permitted during these tests with the exception that, according to the rules, propellers are allowed to be changed.

In the race itself, which will take place on the day following the elimination trials, Nov. 11, the planes will probably be started at intervals, lots being drawn among the contestants for the starting order. The starting line must be crossed on the water. That is to say, there must be material water contact between the main pontoons of the machine at the time the line is crossed. But the starting time will be taken from the moment the starting signal is given. At the end of the race, planes have to cross the line in flight and not on the surface as in starting. Alightings during the race are perfectly permissible, and repairs may be carried out by the crew on the water by means of whatever is on board the plane, without receiving any outside assistance. Fuel replenishments are not permitted.

Italy is to be represented in the contest by three seaplanes of the pontoon monoplane type, constructed by the well-known Italian airplane constructor, Macchi, whose flying boat represented Italy last year in this contest. The engines of the Italian monoplanes are Fiats rated at from 700 to 800 hp. In design, the planes appear to represent the last word in cleanness of streamlining with a fuselage not unlike that of the Curtiss racer design, and even somewhat reminiscent of the lines of the British Supermarine-Napier S4 which was entered last year but which met with an accident before the race. Macchi 39 type, as the Italian machines are designated, is a low wing monoplane with wing radiators and twin-pontoons. The cylinder banks of the big Fiat engine are well streamlined and faired off into the smooth lines of the slim fuselage. While no actual figures for speeds attained during tests of these Macchi 39 seaplanes have been made available, unconfirmed reports state that speeds of over 250 m.p.h. have been reached. The planes are undoubtedly extremely fast and are likely to put up stiff competition for the American machines.

The Italian team of four pilots of the Royal Italian Air Force is under the direction of Maj. Aldo Guglielmetti. The pilots are Major de Bernardi, Captain Guasconi, Captain Ferrarini, and Lieutenant Bascula. It will be recalled that Captain Ferrarini, in 1920, piloted one of the two SVA planes which completed the first flight between Rome and Tokio. Two of the three Italian planes will be piloted respectively by Major de Bernardi and Captain Ferrarini, while the third machine will be flown by either Captain Guasconi or Lieutenant Bascula. Muzio Macchi, son of the manufacturer of the Italian machines, will also be at Norfolk to witness the race together with Signor Castoldi, engineer and designer for the Macchi Company, and Signor Ferrotti, engineer for the Fiat Company.

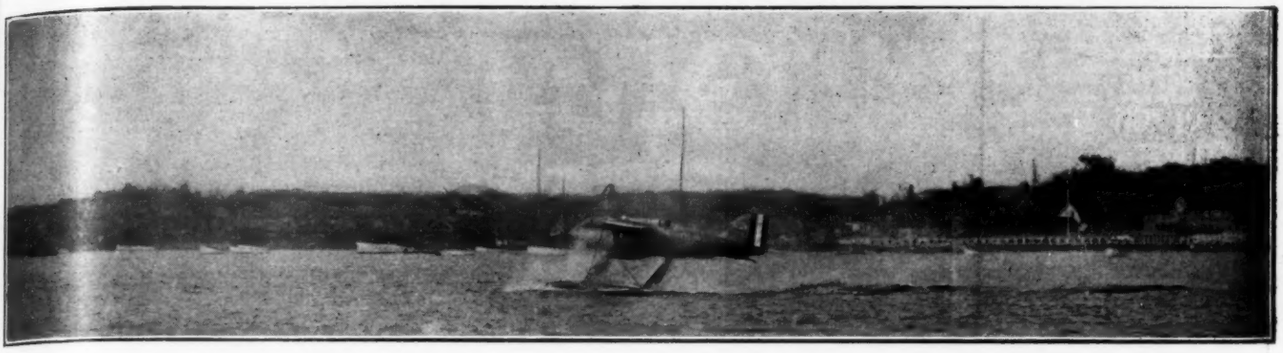
The United States is also to be represented by three machines piloted by members of the U. S. Naval Air Service. The machines, Curtiss R3C racers, are in fact the same planes as were flown in the contest last year, two of which, it will be remembered also took part in the Pulitzer Race last year, when, of course, the pontoon undercarriages were replaced by wheel landing gears. The three planes will be flown, respectively by Lieut. C. C. Champion, U.S.N., Lieut. George Cuddihy, U.S.N. and Lieut. Frank Schilt, U.S.M.C. The American team is under the command of Lieut. Comdr. Howard C. Wicks, U.S.N.

The U. S. Engines

The only material difference between the three American seaplanes is in the engines. With the exception of comparatively minor changes, the planes remain unaltered since their appearance last year. Completely new pontoons have, however, been constructed for two of them. These pontoons, to the casual observer, differ only in that the new ones have a rounded-off nose instead of the sharp point which was characteristic of last year's pontoons. Furthermore, it has been observed that the new pontoons are of streamlined shape when viewed in side elevation, the top lines, for example, being markedly curved while last year's pontoons were perfectly straight

251.5 M.P.H. in a Seaplane

During trial flights of the Curtiss Racer R3C-4, fitted with a Curtiss V-1550 direct-drive engine developing 700 hp., the late Lt. F. H. Conant, U.S.N., on Oct. 27, at Port Washington, L. I., N. Y., unofficially broke the World speed record for seaplanes. Lieutenant Conant flew over a 4 1-2 mile straight course, checking his own time with a stop watch, at a speed of 251.5 m.p.h. He covered the course twice in each direction and the record speed is that obtained from an average of his speeds on each lap. On the previous day, Lieutenant Conant, flying the same machine, made a speed of a little over 250 m.p.h. It will be recalled that the present official World seaplane speed record of 245.7 m.p.h. was set up by Lieut. James H. Doolittle after his winning of the Schneider Cup race last year. This record still holds since Lieutenant Conant's flight was not officially observed.



One of the Curtiss racers undergoing tests prior to the Schneider Cup race

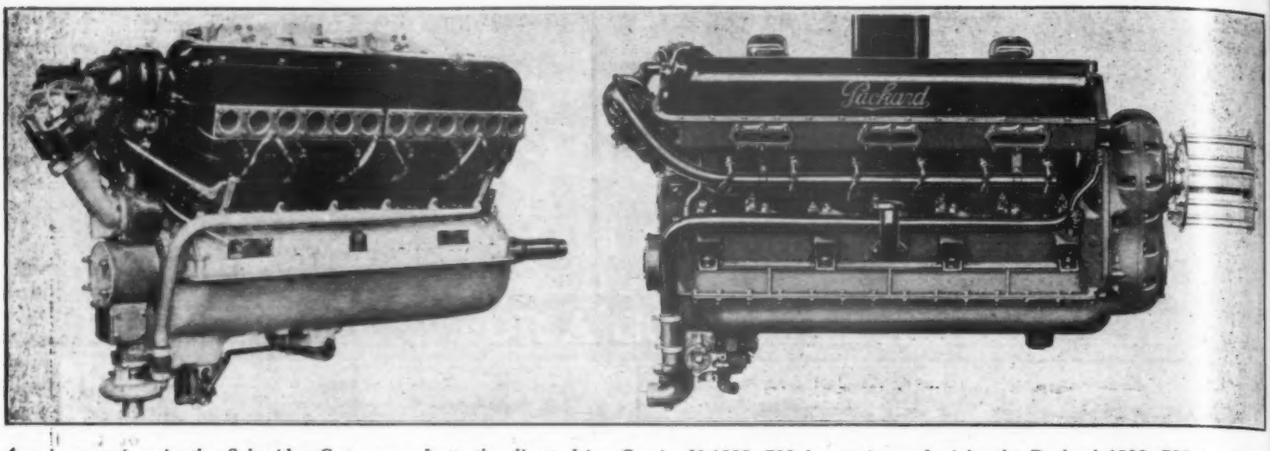
longitudinally along the top.

One of these two planes is fitted with one of the new Curtiss V-1550 engines developing 700 hp. This is a twelve-cylinder engine, a development of the D-12 and the V-1400 which was used in the Schneider Cup planes last year. The other plane is equipped with a special Packard V-1500 geared engine developing 700 hp. The third plane, the unaltered one, is the machine which won the Schneider Cup last year with the Curtiss V-1400 engine of 600 hp. Rather naturally, the most interesting planes are the two with the new engines. They are, to all intents and purposes, identical, and quite apart from the stern competition which is certain to be put up by Italy in the contest, the performances of these two American machines alone will prove of striking interest. Thus, what may be termed a race within a race may be expected between the two machines equipped, respectively, with power plants of two of America's greatest airplane engine manufacturers, Packard and Curtiss.

The development, by the Curtiss Aeroplane and Motor Company, of the R3C racer is the result of years of unfoldment made possible through the extensive pioneer engineering and research work in aeronautics and aerodynamics for which

MEMBERS OF THE ITALIAN SCHNEIDER CUP TEAM

(Above, left to right) Major Aldo Guglielmetti; Major Morio de Bernardi, captain of the team; Capt. Arturo Ferrarini; and, below, Capt. Guasconi and Lieut. Adriano Bacula.

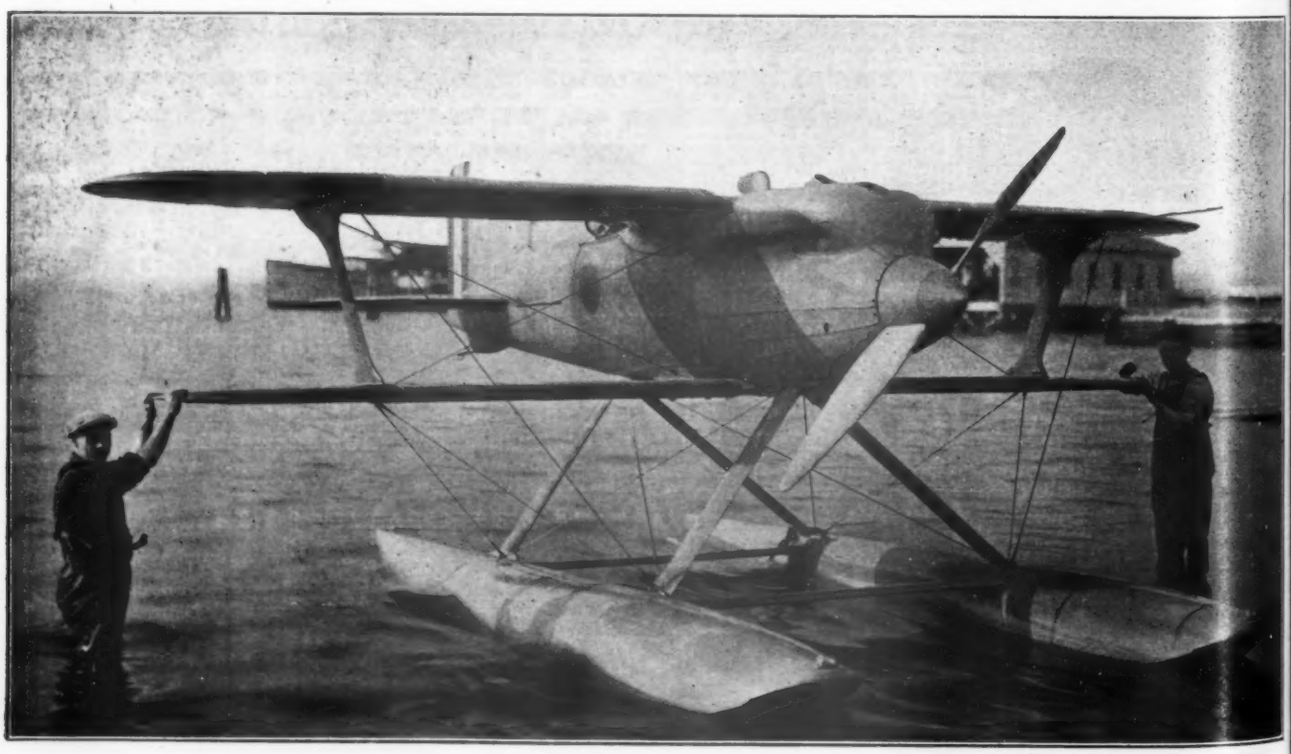


American engines in the Schneider Cup race. Left, the direct drive Curtiss V-1550, 700 hp. engine and, right, the Packard 1500, 700 hp. geared engine.

Curtiss has now become so well-known. The importance of the engine in a racing airplane has long been fully realized and it has been largely as a result of the development of the Curtiss D-12 and the V-1400 that the United States has been enabled to capture and hold the Schneider Cup trophy in the 1923 and 1925 contests and to set up World speed records in the past. Now, this year, the entrance into the racing field of another American engine manufacturer adds greatly to the potential possibilities of the United States securing a permanent hold upon this great international seaplane speed trophy. The Packard Motor Car Company has had an almost unprecedented experience in the manufacture of high class automobile engines and has developed large numbers of airplane engines the equal of any in the World. Packard engines have been very extensively used by the Navy in the PN type long distance patrol seaplanes and in many other types and it is, therefore, natural that the Navy should have turned to the Packard Company to find an engine for one of the machines which is to endeavor to uphold the position of this country in the Schneider Cup race.

To return again to the planes, another feature which has been so largely instrumental in the attainment of the tremendously high speeds which have been set up by the R3C racers, is the question of propeller design. The racers are equipped with Curtiss-Reed duralumin propellers of the forged type, known as the R type. It is, perhaps, doubtful whether the high rotational speeds of these propellers could be obtained with wooden propellers operating under the same thrust load. The propellers employed on the Curtiss racers have an efficiency of no less than 89 per cent. At 2,500 r.p.m. they pull the machine through the air approximately 10 ft. per revolution.

At such a high forward speed it has been found in the past that the control of these racing airplanes is so extremely delicate that in some cases pilots have almost lost control completely due to its being impossible to correct a disturbance, whether intentional or otherwise, without over controlling it. This trouble, however, has been completely overcome in the Curtiss racers through the installation of a perfect system of geared control which actually renders the control of the seaplane such that a pilot could fly the machine in straight flight with hands-off. While it very naturally requires extreme skill to fly one of these high speed planes, their control is, com-



A general view of the R3C-4 Curtiss engined Schneider Cup racer (Curtiss V-1550, 700 hp.)

paratively speaking, very simple as a result of this geared installation.

Furthermore, a pilot's safety is greatly enhanced by the fact that, in spite of the apparent tight fit in the cockpit, he is actually able to wear a parachute and is in a position to use it at a moment's notice. The top of the cockpit, which fits so closely around his shoulders, is provided with hinged sides which open up on the pulling of a latch provided for the purpose and the pilot is then able to leave the cockpit in the normal manner. Even though flying at a very low altitude, should engine trouble be experienced, the momentum of one of these racing planes, due to its inertia and the forward speed at which it travels, would permit a rapid and steep climb to somewhere around 1000 ft. if the pilot suddenly pulled the stick back the moment the engine went dead, so that a parachute drop under such circumstances is perfectly feasible.

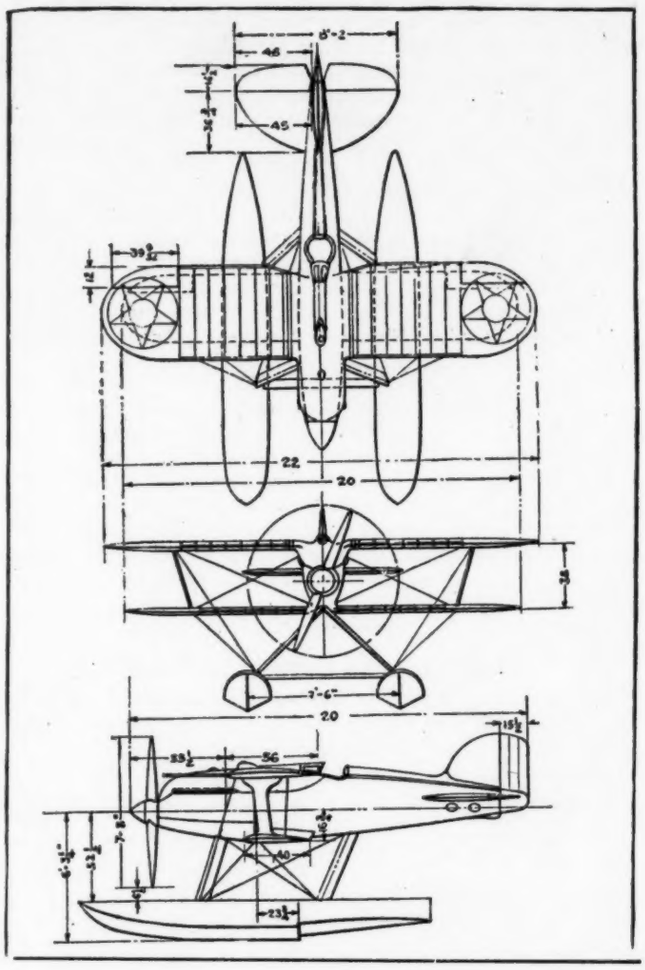
Details of the Curtiss Racer

The Curtiss racer is really a very small machine, having a wing span of only 22 ft. The lower wing is slightly shorter than the upper wing, its span being 20 ft. The overall length from propeller hub to tail, not including the pontoons which project forward considerably, is 20 ft. The area of wings is a total of 144 sq. ft., most of which consists of wing radiator surface. The total weight of the seaplane is 2,738.4 lb.

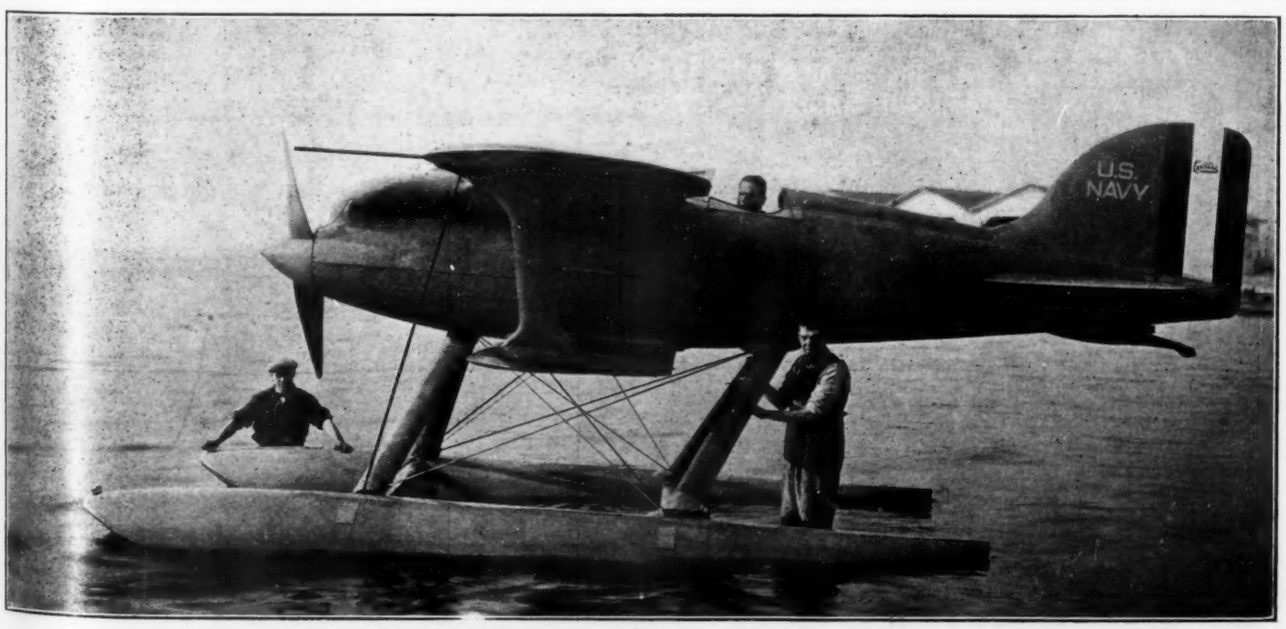
Last year it was found that the 600 hp. engine was very slightly inclined to overheat. With the extra 100 hp. of this year's planes, it has been thought necessary to increase the radiator surface, and, accordingly, the two front struts of the undercarriage have been provided with skin radiators. During the preliminary tests of the Curtiss engined machine there was found no tendency whatsoever to overheat and it is now not altogether certain whether or not the strut radiators will be fitted during the actual race. Decision on this matter will depend largely upon the temperature of the weather on Nov. 10 and 11.

In the Schneider Cup race, Lieutenant Champion will pilot the R3C-4 racer with the Curtiss V-1550 engine, Lieutenant Cuddihy, the Packard engined R3C-3 machine and Lieutenant Schilt, the R3C-2 which won the race last year, equipped with the Curtiss V-1400, 600 hp. engine. The former two machines, as already mentioned, will have 700 hp.

Many aeronautical notables from all over the country, in addition to our foreign guests, will undoubtedly be at Norfolk on Nov. 10 and 11. The race itself will probably start at 2:00 p. m. Nov. 11 although this time has not been finally settled



General layout drawings of the Curtiss racer. The pontoons of the 1926 machine are slightly modified.



The R3C-4 Navy Curtiss Racer with the Curtiss V-1550 engine of 700 hp.

at the time of writing. The best point from which to observe the race will, according to information received, be the flying field at the Air Station of the Naval Operating Base. This will be the starting and finishing point.

The machines are being housed in the hangars at the Hampton Roads Naval Operating Base to which the Italian machines were sent immediately they arrived in the United States on Oct. 23.

Capt. C. Earle Townsend of Norfolk, Va., a former Army flier, has been named chairman of the Timing and Observation Committee, with Charles C. Cheshire as his assistant. The committee, which will be composed of about fifteen members, has, at this time of writing, not been named. It will function in connection with the National Aeronautic Association.

That the race will be the closest and most memorable yet held seems certain. There is no doubt that the Italian machines are extremely fast. As already mentioned, it has been reported that speeds of over 250 m.p.h. have been attained by the little Macchi monoplanes, so that there is no doubt that close competition will be a characteristic of the race on Nov. 11. Those of our Italian visitors who are to pilot the planes have been training like athletes during the past week or so, realizing how important it is that they should be in the perfect physical condition in order to be able to handle their planes to the best advantage. For this reason, practically all entertainment arrangements are being delayed until after the race.

Biographies of the U.S. Pilots

Herewith are printed interesting biographies of the three American pilots who will fly the Curtiss Racers of the United States team in the Schneider Cup Race.

Lieut. George T. Cuddihy, U.S.N.

Lieutenant Cuddihy was born at Alto, Mich., Feb. 22, 1896. He entered the Naval Academy in 1914, graduating in 1917. He was on the U.S.S. Mississippi until June, 1921, when he went to the Naval Air Station, Pensacola, Fla., for aviation training. When he left Pensacola in December, 1921, he went to the Aircraft Squadrons with the Battle Fleet on the West Coast.

In June, 1924, he left the West Coast and came to the Naval Air Station, Anacostia, his present duty. On Oct. 25, 1924, he was a member of the team of Navy pilots taking part in the Naval Air Meet at Bay Shore, Md. In this meet he established a world's record for seaplanes at 188.82 m.p.h. in a Curtiss Racing Seaplane. He commanded the high score aviation gunnery unit for the years 1922-23 and 1923-24.

Lieutenant Cuddihy piloted a Navy R3C-1 seaplane in the Schneider Cup Race, held near Baltimore on Oct. 24, 1925, and was forced down on the last lap of the course due to engine trouble. He was in second place at the time.

He took part in the Philadelphia National Air Races held at Philadelphia, on Sept. 11, 1926, flying a Boeing FB-3 pursuit plane, powered with a Packard 1500 engine, in the open Kansas City Rotary Club Trophy Race for pursuit planes for the military service. He won this race against a field of thirteen planes, with an average speed of 180.495 m.p.h.

Lieutenant Cuddihy also recently established a record for flying time between Philadelphia and Washington when he flew the Navy Curtiss Racer, the R2C-2 which won the Pulitzer Race in 1923, to Anacostia Naval Air Station, a distance of 120 miles by air line in exactly thirty-two minutes.

Lieut. C. Frank Schilt, U.S.M.C.

First Lieut. C. Frank Schilt, U.S.M.C. has been selected to replace Lieut. H. J. Norton, U.S.M.C. (deceased) as a pilot in Schneider Cup Race. He is one of the outstanding pilots in the Marine Corps and has been flying since Sept. 18, 1919 and is especially well versed in pursuit flying.

He was born in Richland County, Ill., on March 18, 1895; graduated from graded and high schools at Olney, Ill., and had two years in Mechanical Engineering at Rose Polytechnic Institute, Terre Haute, Ind.

Lieut. Comdr. Homer C. Wick, U.S.N., in charge of U.S. Schneider Cup Team.

He enlisted in the Marine Corps, June 23, 1917 and served as a private until June 9, 1919. After this date he was a Cadet Student Naval Aviator and received his pilot's license Sept. 18, 1919. He was commissioned as Second Lieutenant, U. S. Marine Reserve Corps, June 10, 1919, and served in this capacity until Oct. 10, 1919, when he was given a temporary rank of Second Lieutenant in the active Marine Corps and held this rank until April 13, 1921, when he was given a permanent rank as Second Lieutenant. He served in this rank until the present date. Lieutenant Schilt graduated in Aerology at Pensacola in 1923 and as a Naval Photographer at Chanute Field, Rantoul, Ill., May 2, 1925.

Lieutenant Schilt received a Letter of Commendation from the Major General Commandant, Marine Corps for service rendered the U. S. Geological Survey in securing air photographs of Coast and Rivers of Santo Domingo and Haiti on May 21, 1921. He also received a Letter of Commendation from the Secretary of War for taking third place in

The American Schneider Cup pilots. Left to right: Lieut. C. C. Champion, U.S.N.; Lieut. G. T. Cuddihy, U.S.N.; and Lieut. C. F. Schilt, U.S.M.C.

Annual Machine Gun and Bombing Matches at Langley Field, Va., June 3, 1926.

Lieutenant Schilt, pilcted a DT-4 plane, powered with a Wright T-3A engine in the Detroit News Trophy Race (bomber) held at Mitchell Field on Oct. 13, 1925. He finished in second place with an averaged speed of 118.9 m.p.h., being just a fraction of a second behind the winner, Lieutenant Harmon, U.S.A., whose speed was 119.9 m.p.h.

Lieut. Carleton C. Champion, U.S.N.

Lieut. Carleton C. Champion, U.S.N., was born at Savannah, Ga. on Sept. 20, 1896. He entered the Naval Academy June 23, 1916, and graduated June 7, 1919, (class of 1920). He served on board the U.S.S. Michigan after his graduation, and also on the U.S.S. Olympia, in the Mediterranean. He was then transferred to the Destroyer Squadrons, Scouting Fleet. In 1922, he completed the aviation course at Pensacola and was designated Naval Aviator. Lieutenant Champion served two years in Fighting Plane Squardon No. 1, Aircraft Squadrons, Battle Fleet, and is now on duty in the Engineering Section, Bureau of Aeronautics, Navy Department.

Lieutenant Champion has flown over 1,000 hr., including flights in all types of aircraft. He piloted the Wright Apache in the National Air Races at Philadelphia in September, 1926, and took first place with the Wright-Bellanca in the speed and efficiency race for commercial planes. He also won both the speed and efficiency test in the transport race.

Lieut. Frank H. Conant, U.S.N.

On the afternoon of Saturday, Oct. 30, while flying from Washington, D.C. to Norfolk, Va. 2nd Lieut. Frank H. Conant, U.S.N. was killed when his airplane crashed at Winter Harbor, Mathews, Va. His seaplane is believed to have hit something projecting from the water when flying close to the surface.

With the passing of Lieutenant Conant the Navy has lost one of its most skillful and resourceful fliers and one of its finest young officers. He was considered one of the Navy's crack pilots and was a member of the United States team for the Schneider Cup race to be held at Norfolk, Va., on Nov. 11. He was to fly the R3C-4 Curtiss racer with the V-1550

Lieut. Frank H. Conant, U.S.N.

engine and, as is reported elsewhere in this issue of AVIATION, during tests of this plane only a few days before he met his death, set up an unofficial world speed record for seaplanes of 251.5 m.p.h. He was on his way to Norfolk, flying a standard naval service seaplane when the accident which resulted in his death occurred.

Lieutenant Conant was born at the U. S. Naval Academy, Annapolis, Md. on Nov. 15, 1898. He entered the Naval Academy as a midshipman in June, 1916, graduating in June 1919 (Class 1920), was commissioned an Ensign, and assigned to the battleship Oklahoma for duty. In 1920, while attached to the Oklahoma, he requested flight instruction at the Naval Air Station, Hampton Roads, Va. in addition to his regular duties on board ship, and was qualified as a pilot. He served on the Oklahoma for two years and was then transferred to the U.S.S. Stewart of the Destroyer Squadrons Atlantic Fleet, acting as Chief Engineer of that Vessel.

In June, 1922, on becoming available for aviation duty, under the Navy Department's three years at sea policy, he was detached from the Stewart and ordered to the Naval Air Station, Pensacola, Fla., for the course of instruction there. He was promoted from Ensign to Lieutenant (junior grade) at this time. Upon the completion of the regular course at Pensacola, Lieutenant Conant was given an additional course in combat flying and pursuit work.

In March, 1923, he was assigned to Fighting Plane Squadron No. 2, of the Aircraft Squadrons, Battle Fleet, where he operated with squadron in San Diego, Calif.; Seattle; Wash.; Panama; Porto Rico, an Hawaii. He was among the first twenty-five in the United States to be qualified for flight operations on board a carrier, and he operated from the decks of the Langley on various missions along the Pacific Coast, at sea, and in the Hawaiian Islands.

In June, 1925, Lieutenant Conant was detached from the Fighting Plane Squadron and was assigned to duty as Operations Officer in the Flight Division, Bureau of Aeronautics, Navy Department, Washington, D. C. He became a member of the Navy Racing Team shortly after his arrival on the East Coast, and was designated as Navy Alternate for the Open Pursuit Race at the Pulitzer Races held at Mitchell Field, Garden City, L. I. on Oct. 10, 1925. He was assigned the Navy R2C-2 Racer and acted as alternate pilot at the Schneider Cup International Seaplane Race held at Baltimore, Md. last year. In November, 1925, he was promoted from Lieutenant (jg) to Lieutenant. U.S.N.

Lieutenant Conant's flying experience includes over 1300 hr. in 38 different types of landplanes, seaplanes, and amphibians, ranging from slow service type boats up to racers, the greater part of his time being in single-seater pursuit planes.

At the Curtiss Marine Trophy Race held at Washington, D. C. on May 14, 1926, he was the winner of the race for the observation group. On June 26, 1926 he won first place in the stunting competition at the air races held under the auspices of the 27th Division New York National Guard, at Miller Field, Staten Island, N. Y. At the National Air Races held during September, 1926, at the Sesqui-Centennial Exposition at Philadelphia, he won the Bamberger Trophy for excellence in military aerial acrobatics for pilots of the Army, Navy and Marine Corps.

The death of Lieutenant Conant is a very severe loss to the Navy and to the country. He was one of the most enthusiastic supporters of aviation in the service.

Three Engine Plane Crosses the Rockies

Commander Byrd's three-engine Fokker monoplane (three Wright Whirlwind 200 hp. air-cooled engines) in which he flew over the North Pole earlier this year, has recently arrived on the West Coast. As reported a few weeks ago, the machine, through the assistance and cooperation of the Guggenheim Fund for the Promotion of Aeronautics, is on a tour of the country for the purpose of stimulating interest in the possibilities of air transportation. According to Floyd Bennett, the pilot and Commander Byrd's companion in the polar flight, the machine crossed the Rockies without any difficulty at 14,000 ft. While the machine is by no means fully loaded, it carries several passengers and a quantity of luggage.

Incidentally, it is of interest to note that this is the first time that a modern three-engine airplane has been on the West Coast and undoubtedly its presence will attract much attention.

Young Joins Commerce Air Branch

Maj. Clarence M. Young, of Des Moines, Iowa, veteran of the World War, has been appointed chief of air regulations and inspections of the Department of Commerce under Assistant Secretary of Commerce for Aeronautics, William P. MacCracken, Jr.

During the war Major Young served as a first lieutenant, United States Army Air Force, attached to the Italian air service. He was shot down while serving on the Italian front, and held a prisoner of war for five months in Austria. He has received a citation for bravery from the Italian Government.

Major Young is a graduate of Yale University and is well versed in matters pertaining to aeronautics. He is a reserve officer of the air corps of the Army, and has been assigned by the War Department as commanding officer of the 313th Observation Squadron 88th Division, 7th Corps Area.

WHERE TO SEE THE SCHNEIDER CUP RACE

According to information received from Norfolk, Va., the best point from which to view the Jacques Schneider Cup race on Nov. 11, will be the flying field at the Air Station of the Naval Operating Base. This will be the starting and finishing point of the race.

The Great International Seaplane Classic

The Historic Schneider Trophy First Contested in 1913. Seaplane Speeds Climb from 45 m.p.h. to 232 m.p.h. in Eight Schneider Contests.

ON THURSDAY, Nov. 11, at Norfolk, Va., the ninth annual contest for the Jacques Schneider International Seaplane Cup will be held, America racing against Italy for the seaplane speed honors for 1926. The contest is already attracting world-wide interest in spite of there being only two nations represented. Each year, as the seaplane speed record is pushed up, so international zeal and interest grow. The event itself dates back to 1913 when M. Jacques Schneider, a French aviation enthusiast and a member of now famous French firm of armament manufacturers, put up the trophy which has since borne his name, for annual international competition. The race in that first year was held at Monaco over a closed course of 150 nautical miles (172.83 land miles) or 278 km. Since then, the distance over which the race has been run has changed from year to year. Just what is the rule concerning this particular feature is not perfectly clear but it is probably largely concerned with the geography of the locality at which the race is being held.

The First Schneider Contest

The 1913 Schneider cup was won by the famous French pilot, M. Prevost, flying a pontoon Deperdussin monoplane with a Gnome rotary air-cooled engine developing 150 hp. Prevost's time for the 178 km. was 3 hr. 48 min. 28 sec., representing an overage speed of 72.6 km.p.h. (45.75 m.p.h.). Compare this speed with the 232.6 m.p.h. speed made by Lieutenant Doolittle of the U.S. Air Corps in last year's race and a striking idea of the development of speed flying during the past twelve years will be obtained.

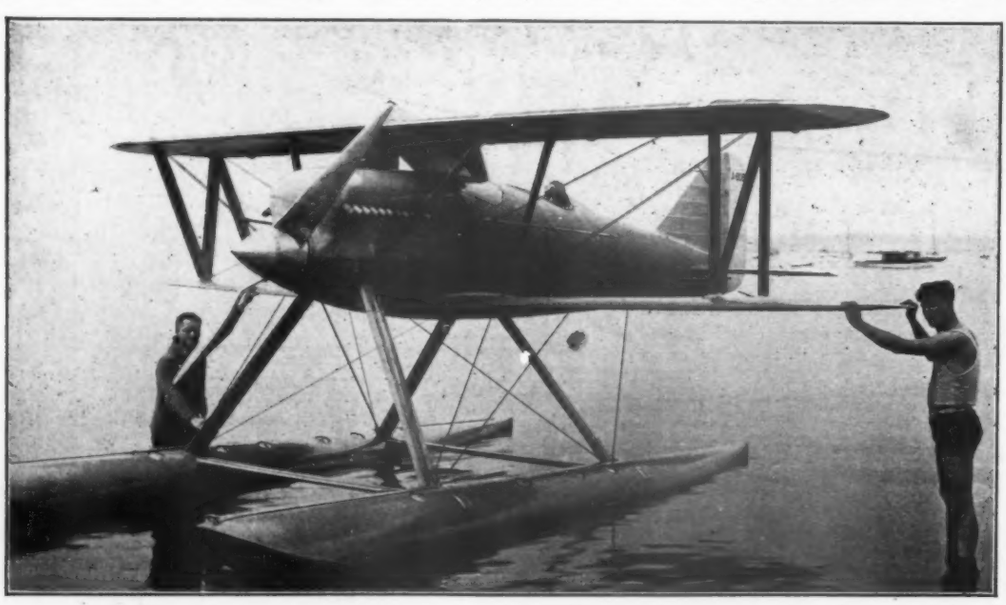
To return, however, to the history of this international air classic, the following year, 1914, the Schneider Cup race was again held at Monaco, the distance this time being 280 km. According to history, the race was won easily by the British pioneer pilot, Howard Pixton, flying a Sopwith twin-pontoon seaplane fitted with a Gnome-Monosoupape rotary air-cooled engine of 100 hp. Pixton's time over the 280 km. was 2 hr. 0 min. 13 2/5 sec. representing an average speed for the course of 139.7 km. p. hr. or 86.8 m.p.h.

Owing to the World War, there was no Schneider Cup race held in the following years until 1919 when, the contest having been won last by Great Britain, the race was held at Bournmouth, England. Unfortunately, on the day of the race the weather was peculiarly bad and a thick mist obscured parts of the course. According to historic reports, the mist was particularly bad at the Swanage turning point and all the competitors with the exception of the Italian, Janello, gave up the contest. Janello was flying a Savoia biplane flying boat. He covered the required number of laps in the race but as he was not once seen by the judges at the Swanage mark boat, there was much controversy over whether or not he had properly completed the race. It was finally decided

The Schneider Cup—symbolizing Zephyr kissing the waves

to annul the race altogether and as a compliment to the Italian pilot for his skill and pluck in flying the entire course in spite of the adverse weather conditions, it was decided to award to the Italian Aero Club, the organization of the race for the following year as though a victory had been scored by Italy although the Schneider Cup remained in England and no race for the year 1919 was recorded.

The year 1920 saw Venice the background for the international seaplane speed classic, the organization of the contest



Lieutenant Rittenhouse in the 1923 Curtiss Racer (Curtiss D-12), which won the Schneider Cup that year at 177.38 m.p.h.

being under the auspices of the Aero Club of Italy; according to the arrangement of the year previous. Great Britain and France took part in the contest against Italy but the prized Cup went to the latter nation, the Italian pilot, Bologna making fastest time flying a Savoia flying boat. He covered the 375 km. of the course in 2 hr. 10 min. 35 sec., thus making an average speed of 172.3. km.p.hr. or 107 m.p.h. Thus, Italy was the envied guardian of the Schneider Cup for the year 1920-21, and, according to precedent, the following year's contest was again held in Italian waters, Venice again being chosen as the rendez-vous of the speed pilots of the nations. The course in 1921 was 370.4 km. long and the race was again, for the second time in succession, won by an Italian flier, again piloting a Savoia seaplane of the flying boat type. De Briganti the pilot, covered the course in 2 hr. 4 min. 29 sec. at an average speed of 178.5 km.p.h. (111 m.p.h.).

The 1922 Race

In the following year Italy very naturally made a great effort to win the trophy for the third time in succession as this would have meant permanent possession for her since, according to the rules governing the donation of the Schneider Cup, any nation winning three times in five years secures permanent possession of the Trophy. The British, however, won the 1922 Schneider Cup race held at Naples, Capt. H. C. Biard, who was one of the British representatives last year in the same contest at Baltimore, winning at a speed of 234.6 km.p.h. or 145.7 m.p.h. Captain Biard flew the Supermarine Sea Lion equipped with a Napier Lion 450 hp. water-cooled engine, and covered the 370 km. course in 1 hr. 34 min. 51 3/5 sec., thus setting a real increase over the previous year's speed.

The 1922 Schneider Cup race having been won by Great Britain, the 1923 contest was held in British waters, Cowes, Isle of Wight, being chosen as the site. This year marked the entry of the United States for the first time into the contest for the much coveted seaplane speed trophy. The American chances were placed in the hands of the Navy which certainly made an excellent showing in every respect. Three Curtiss racers on pontoons were sent to England on a United States cruiser together with a team of crack pilots and picked mechanics. The only defenders of the cup were Great Britain, with three entries and France, with four. Two of the British entries, the Blackburn "Pellet" and the Hawker-Sopwith cracked up before the race and Supermarine Sea Lion flying boat, the only remaining British entry, was hopelessly outclassed in point of speed by the American machines. All the French entries had trouble before the start of the race. Lieut. David Rittenhouse, U.S.N., flying a Curtiss racer with a Curtiss D-12 engine took first place with a speed of 285.5 km.p.h. or 177.38 m.p.h. for the 345 km. course. Lieutenant Rutledge Irvine, flying a similar plane, came in second, at 173.46 m.p.h.

Thus, for the first time in its history, the Jacques Schneider Cup came across the Atlantic Ocean where it has remained during the past three years. In 1924, Great Britain built a plane to be sent across the Atlantic to contest the Cup with the United States, but misfortune befell it before it left British shores. The plane was produced by the Gloucestershire Aircraft Co., but it was wrecked during a trial flight and as no other machines were available the 1924 race was called off by the United States, rather than that this country should secure a win as a walk-over.

The Supermarine "Sea Lion", 450 hp. Napier Lion engine, which won the Schneider Cup for England in 1922 and lost to the U.S. Navy in 1923.

The lapse of two years appeared to create renewed enthusiasm for the Schneider Cup contest. The expense of sending airplanes and crews across the Atlantic to compete against America for the Cup had been somewhat of a deterrent the year before but the Summer of 1925 saw enlivened activity both in Italy and in England in the preparation of speed seaplanes with which these countries hoped to wrest the much prized trophy from the United States.

Last Year's Race

Bay Shore Park, Baltimore Md. was chosen for the scene of the contest and the date set at Oct. 26. There were two Macchi flying boats with Curtiss D-12 engines representing Italy and Great Britain was represented by three pontoon seaplanes, one the Supermarine-Napier S4 monoplane, and two Gloster-Napier biplanes, each with Napier Lion engines. The United States team consisted of the three new Curtiss Racers with Curtiss 600 hp. V-1400 engines, which were built last year especially for this and the Pulitzer Trophy races. For the latter race, of course, they were equipped with land undercarriages.

The 1925 Schneider Cup contest brought many aviation notables to this country from abroad and an excellent contest

Lieut. James Doolittle and the Curtiss R3C-2 Racer on which he won the 1925 Schneider Cup Race of 232.573 m.p.h. and set a World seaplane speed record of 245.713 m.p.h.

was put up by the foreign representatives although the cup was won for the United States by Lieut. James H. Doolittle, U. S. Army Air Corps, flying one of the Curtiss Racers at a speed of no less than 232.573 m.p.h. over the 350 km. course. His speed was the more remarkable in that while it represented the average over a 350 km. triangular course, it was nearly 44 m.p.h. faster than the World speed record for seaplanes set up the previous year by Lieut. G. Cuddihy over a straight 3 km. course. Lieutenant Cuddihy's record speed in 1924 was 188.82 m.p.h. Again, the speed made by Lieutenant Doolittle over the 350 km. course was actually 5.873 m.p.h. faster than the World seaplane speed record set up by the British pilot Capt. Henri Biard in the Supermarine-Napier S4 monoplane during test flights in England, just before its being sent to this country.

Foreign Eliminations

Considerable misfortune befell our foreign visitors last year, starting with the unfortunate crash of the British Supermarine-Napier S4 piloted by Capt. Henri Biard, who, incidentally, won the Schneider Cup in 1922, when he was flying in the elimination trials. This incident was followed by the wreck of the first of the Gloster-Napiers, piloted by Bert Hinkler, also during the elimination trials. This left the Gloster-Napier III as the only British representative, piloted by Capt. Hubert Broad. This plane was probably the highest powered machine in the race since its Napier Lion engine, while nominally developing 450 hp., was actually boosted up to something near 700 hp. Captain Broad came in second in the race with a speed of 199.169 m.p.h.

The only other misfortune during the contest was that which eliminated one of the two Italian entries. The Macchi flying boat which was to have been flown by Riccardo Morselli developed engine trouble just prior to the mooring-out tests and was consequently abandoned by the Italian crew who gave all their attention to their remaining entry, the other Macchi boat. This plane, piloted by Giovanni de Briganti, took third place with a speed of 168.444 m.p.h. Both Lieutenant Cuddihy and Lieutenant Ofstie, flying the other two Curtiss racers in the American team, were forced down during the race and did not, therefore, finish.

World Speed Record

Thus, the honors for the winning of the 1925 Schneider Cup race went to the Army Air Corps and, furthermore, Lieutenant Doolittle set up three World records during the race, namely, the World seaplane speed record for a closed course (232.573 m.p.h.), the World seaplane speed record for 100 km. (234.772 m.p.h.) and the World seaplane speed record for 200 km. (234.355 m.p.h.). On the day following the race, Lieutenant Doolittle went up again in his Curtiss racer and set up a World straightaway speed record for seaplanes over the 3 km. course, flying at no less than 245.713 m.p.h.

Thus closes the history of the Jacques Schneider Cup and the annual contests for this much prized international trophy. America has won the Cup twice during the past five years and should this contest result in a third win for the United States the Schneider Cup will become the permanent possession of this country according to the rules laid down at the time of the donation of the trophy. While it is true that Italy, too, has won the cup twice before, she has only won it once during the past four contests and should the race this year result in a win for Italy, it will again be up for competition next year, 1927.

A map of the course of the 1926 Schneider Cup Race. The race will be flown in the anti-clockwise direction with the Naval Operating Base (C) as the starting and finishing point.

The Protection of Duralumin from Corrosion

By WM. NELSON
Lieut. Comdr. (CC) U.S.N.

[In the Nov. 1 issue of AVIATION, *Commander Nelson, who has been closely connected with the duralumin research and construction work at the Naval Aircraft Factory, discussed at some length the problems of corrosion in duralumin. In the present article, the author deals at some length with the methods adopted for the protection of duralumin structures from the effects of corrosion and shows how the use of this valuable alloy metal is made perfectly reliable and satisfactory in aircraft construction.*—EDITOR]

THE NATURE of duralumin as now made is such that if left uncoated and unprotected in the uses in which industry employs this light alloy, corrosion will take place and the physical properties will be reduced accordingly. That a stainless and non-corrodible alloy is possible is without the scope of this paper and the use of some form of covering to preserve the material against the ravages of corrosion is presumed to be necessary. It is to this covering that most metals have turned for proper maintenance so it is logical that duralumin should also seek protection therein without a feeling of derision arising.

Coatings are used in most cases for their preserving effects, but other reasons for the application exist and must be given due consideration in any arrangement proposed. The matter, therefore, becomes exceedingly complicated unless the relative importance of each function is specified. With duralumin in aircraft it is assumed that protection of the material is the outstanding feature to be attained, all other objects being secondary thereto.

Aircraft construction demands the use of relatively thin sections of duralumin. These thin sections of metal in turn fail rapidly and completely unless special protective coatings are used. The stage has not been reached yet where our craft will stand the added weight of scantlings proportioned to take care of a reasonable amount of corrosion, so the problem resolves itself into a case of preserving the original dimensions by the application of paints, varnishes, or other coverings high powered in their ability to inhibit deterioration in any form.

Duralumin Problems are Specialized

Wood construction and steel construction have heretofore prevailed as structures and relatively satisfactory protections have been devised for them. On the other hand aluminum alloys are new, and the different behavior of platings and paints on duralumin compared to that on steel requires the establishment of precedents not previously existing. Examples of attempts to follow the technique laid down for other metals on the protecting of duralumin have resulted in dismal failures with experience again acting as the expensive teacher. It is an opinion, however, that more efficient means for resisting deterioration in steel and wood will come from the developments of duralumin coatings.

The fundamental principle of protecting duralumin from corrosion can be stated to be the establishment and the maintenance of an inert insulation between the metal and the corroding mediums. In aircraft, the corroding medium with which we are most concerned is moisture, so our problem resolves itself into waterproofing the surface of the metal. This, for aluminum alloys, is far more difficult than most engineers are willing to admit, and so far duralumin craft have suffered the consequences.

That duralumin can be protected against corrosion has been amply demonstrated in tests and in practice. That the matter demands detailed care has also been demonstrated in tests and in practice. Examples are available, however, where duralumin has served well without any protective finish, but these examples do not meet the service to which duralumin structures are now put and for that reason are not representative. It is noteworthy in this connection that as long ago as 1896 extensive tests were conducted to exemplify the value of varnishes and paints on aluminum. It is also of interest to note the apparent lapse of attention to the matter between that time and the present. Today, it is recognized that the life of the metal is dependent on an efficient preservative.

If the surface of duralumin could be made impervious to corroding mediums at no expenditure of weight we would arrive at the ideal solution. Many factors enter into the practicability of that problem, however, and the ideal is not reached. So our efforts are concentrated on obtaining a coating or finish which will be corrosion resistant by presenting a near tight film at a reasonably low expenditure of weight and cost.

In considering and comparing finishes and coatings as a protection for duralumin it is presumed that any failure of the coating will eventually result in corrosion. This is not exactly true, but, by comparing the establishment and maintenance of an intact film rather than the many factors entering into the combination of coating and corrosion we reduce the difficulties. Therefore in the following, the coverings are compared on their own merits with questions on corrosion entering to suit.

Preliminary Considerations

Consideration must be given to three things in drawing conclusions on protecting mediums for duralumin, namely:

(1). Preliminary work on metal necessary to prepare the surface for the coating.
(2). Properties of the coatings.
(3). The effect of the coating on the properties of the metal coated.

Those finishes which require no preliminary work in preparing the surface are the most desirable for use, other things being equal. In some cases this preparation amounts only to cleaning with gasoline, benzol, carbon tetra-chloride, or some patent liquid to remove oil products which have come on during the manufacture. In other cases it is necessary to disturb the surface mechanically, as by sand blasting, wire brushing, emery paper, etc. If the surface of duralumin is worked very much, as is the case in sand blasting thin sheet, re-heat treatment is necessary to restore the physical properties. The other type of preparation consists of etching the metal by some chemical action. Caustic soda solutions or nitric acid solutions can be used very effectively to produce a satin finish on duralumin by immersing it in the solution for periods of time depending on the concentration. It is an essential that washing in clean water must follow the etching dip.

Properties of the Coatings

The methods of protecting against corrosion in duralumin naturally divide themselves into the following groups:

(a). Painting; (b). Electrolytic treatments; (c). Other treatments.

Painting includes the use of various oils and pigments and combinations thereof. Electrolytic treatments include metal platings applied by means of electric currents and the oxidation of the duralumin surface as in the Anodic Process. Other treatments take in polishing, buffing, etching and the metal spray application. All of these can be compared together under the classifications into which the properties of coatings are distributed.

The properties of coatings can be classified into the following:

(a). Method of application of the coating;
(b). Weight of coatings;
(c). Cost of coatings;
(d). Resistance to mechanical treatment;
(e). Resistance to weathering;
(f). Resistance to special agents;
(g). Color, appearance, etc.;
(h). Special properties.

Oils, paints, varnishes and enamels can be applied by brushing, spraying, or dipping. The particular process followed usually depends on the costs involved. Electro-plating and the Anodic Process require special equipment and methods peculiar to aluminum alloys. In general, the application of oils, paints, varnishes, etc. meets the popular demand and it is only to increase the resistance to corrosion and for appearances sake that the other means are employed at all on duralumin.

Weight Question is Important

The weight of coatings is important since the use of duralumin has been brought to its present state as an aircraft material through its advantage over steel and other metals of being light in weight. To lose any of this advantage by heavy coatings is inadvisable and in the case of airships, impracticable. Since the weight increases in proportion to the thickness of the coating and since additions to the thickness become of decreasing importance as the weight increases, a point of maximum advantage exists with a relatively thin covering.

The cost of finishes involves the cost of applying the finish and the life of the protective means employed. A coating soon comes into disfavor if the cost of material and labor are high regardless of its life. A cost not exceeding two cents per square foot of surface appears to be reasonable. Naturally, however, there are circumstances where a much higher figure is commanded for special reasons.

Note Corrosion of rivets due to lack of protection afforded by an anti-corrosive anti-fouling paint.

The resistance of the finish to mechanical treatment depends on the adhesive effect of the coating, the hardness, the brittleness, and other factors. The best test in this respect is actual use. It is in many cases in aircraft construction desirable to coat duralumin parts prior to an assembly. In those cases the finish should be capable of resisting shop wear. A coating relatively elastic, tough and tenacious ordinarily meets all the requirements.

Failure of a finish results sooner or later in corrosion of the metal. Its resistance to weathering is a good measure of its effectiveness as a protection. Sunlight, rain, heat, cold, salt spray, etc. are the usual elements the coating must resist and peculiar as it may seem these elements work very effectively together to destroy the best of laid plans. Paints will blister, crack, alligator and what not; platings will curl and come off; oxides will dissolve off; etc. and corroding mediums find their way through these impaired finishes very rapidly and manifest themselves by the appearance of aluminum oxides and hydroxides. Consequently, the weathering effect should be practically nil to make ordinary care all that will be necessary for keeping out extensive corrosion. In this connection it might be well to mention that duralumin left in some storages for a year or longer has shown indications of deterioration due to weathering. To protect against such effects it is advisable to coat the stock when received with at least one coat of finishing compound.

Many ingredients exist in the waters where seaplanes and boats are used. Their nature is not always known but if the duralumin covering is inert to their actions the ultimate in this respect is attained. Other special agents to be reckoned with are gasoline, oil, dope, engine exhaust gases and cleaning compounds. It is in some instances desirable to vie with these special agents in limited parts of aircraft only.

The colors available and the appearance of the finished duralumin when coated with these colors has a bearing on the freedom of use. Only a few colors are used in aircraft and they are of secondary importance. A smooth finish capable of easy cleaning is a highly desirable factor, though, and is demanded on account of the fact that trimness and neatness cannot accompany service without repeated scrubbings.

The special properties are numerous. The insulating effect or its dielectric strength for certain places must be considered. The anti-fouling properties of the coating are essential data in considering its use for the hulls of flying boats. And in some other places, due to the relative softness of duralumin, an erosion resisting finish is necessary.

Effect of the Properties on the Metal

The first effect to be considered is the change, if any, produced on the chemical and physical properties of the material finished. For instance, sand blasting reduces the ultimate tensile strength and elongation of thin sheet duralumin materially. Some other chemicals may alter the desired properties so as to make their use detrimental. The usual procedure to determine the effects of coatings on the physical properties is to subject them to tensile and bend tests after the application.

Acids in paints may cause serious corrosion without any assistance from outside elements. Metallic compounds used either as pigments in paints or in plating may produce a couple with the alloy requiring only an electrolyte to cause electrolytic corrosion.

From this, it can be seen that the coating should be electropositive to duralumin and should contain no free acids or salts. An inert coating preserves sufficiently if it makes an intact surface.

To determine by laboratory methods what happens when the finished duralumin is placed in service exposures to weather, salt sprays, gasoline, and hot and cold water are employed. It is practically certain that any material which withstands these tests will withstand service insofar as the particular test covers the use. The length of time a coating remains intact under these exposures is a measure of its effectiveness and is the criterion on which its use is recommended. The degree of corrosion in a salt spray in a fixed time gives a value readily comparable with other results obtained with and without coatings.

Oils and Greases

The use of mineral oil and greases as rust preventatives has been recognized in industries using steel. Their use in protecting duralumin can be said to be somewhat analogous. It has been known for some time that oil used for lubricating purposes is in a measure a corrosion preventative for aluminum alloys. This has been brought out particularly in duralumin structures near aircraft engines; but owing to the water which settles with the oil in the bilges this means of protection is not considered to be sufficiently effective to take the place of more permanent coatings.

Oil and greases have been used as a general protection on duralumin aircraft but they present the following disadvantages: (a) They are relatively heavy; (b) The period of usefulness is extremely limited; (c) They do not present a desirable surface for general service.

For certain purposes, however, a rust preventative compound is considered a good protective coating and will prevent corrosion in duralumin with due attention. Where duralumin is kept in storage for considerable periods of time and where the corroding mediums are not strong, a light coat of compound will tend to keep out corrosion. Mineral oils and light greases are too light to serve this purpose as effectively as the heavy rust preventative compounds. Duralumin pins,

bolts, nuts, shackles, etc., in craft in use where wear tends to remove paints and where paints are impracticable can be satisfactorily protected with the compound. Structural tubes and enclosed shapes not readily coated with paint can be dipped in hot compound and drained to produce a good inside finish. However, any use to which this grease is put will demand frequent inspections to insure the proper maintenance of the coating.

None of these oils, greases, or compounds used should contain any free acid and if practicable no water should be present. Some prepared compounds have a water absorbent ingredient in their make-up to take out moisture. The advantage of this is apparent.

The method of application does not require any special preparation of the surface other than having it dry. The articles to be coated are dipped in hot oil, grease, or compound and cooled in air. A thin coating effectively maintained is as efficient as a thick coat and is more easily removed. If a piece previously coated with grease is to be painted, careful removal of the grease with benzol, alcohol or carbon tetrachloride is essential. Paints and varnishes will not adhere to an oiled surface.

Paraffines, wax, etc., alone or in compounds can be used in the same manner and as effectively as oil, grease, etc.

Paints and Varnishes

Paints, varnishes and enamels are the most prolific sources for protective coatings. Extensive experiments have been carried out using them for finishes on duralumin. These tests have not been entirely satisfactory because they have not been standardized and the data derived therefrom are not comparative. Nevertheless, there has been a consistency in these tests in that most paints are extremely inefficient on duralumin aircraft subjected to a salt atmosphere. These failures have been along two lines particularly noteworthy; one is the lack of adhesion of the paint to duralumin and the other is the lack of continuity in the film produced. In any case though, paints and varnishes are the most important protective coatings readily applied, and accordingly, require more detailed consideration than the others. It is realized that the ultimate has not been attained yet; but experience has given enough data to warrant the greatest care in the selection and the application of this mainstay of all protective finishes.

As duralumin is ordinarily received for use, it is coated with a thin film consisting largely of aluminum oxide. This film if not broken down is very smooth, making adhesion of paints and varnishes thereto difficult. This film can be broken down mechanically or chemically so as to produce any desirable finish from a satin to a relatively rough surface. The degree to which the surface must be prepared depends on the paint or varnish in use.

The methods in use for breaking down the oxide film mechanically include sand blasting, wire brushing and sand papering. This is called a finishing operation.

Scratch Brush Preparation

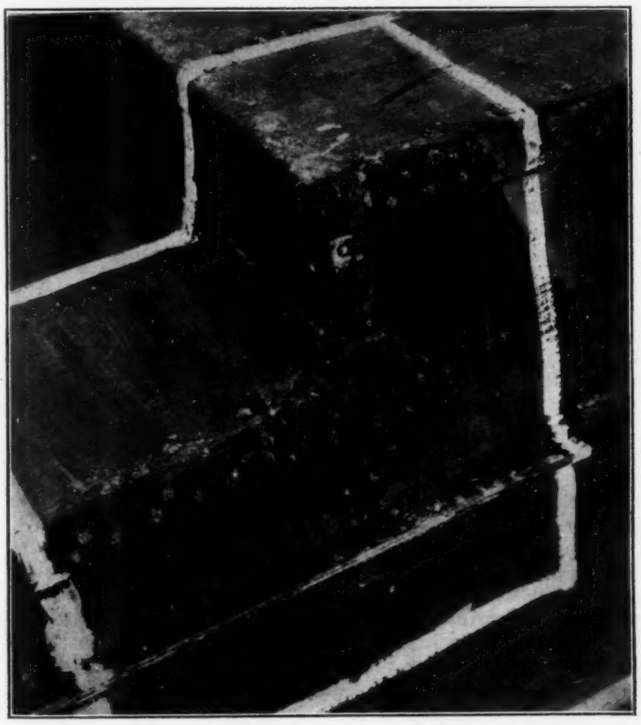
The finish known as Scratch Brush is accomplished by a revolving wire brush. It has the appearance of etched glass and is done in four grades, namely, rough, fine, superfine and extra fine. The surface to be finished is first cleaned of all grease or oil. To produce the rough scratch brush the work is done on a lathe with a steel wire (.005) brush about 10 in. in diameter operated at about 1200 r.p.m. The other finishes use smaller brushes and less speed.

Wire brushing, sand papering and sand blasting are only relatively useful but serve well in meeting the field requirements. They are particularly useful in removing products of corrosion for refinishing. For sand blasting No. 100 sand is used with reduced air pressure and with the object 10 in. from the ¼ in. nozzle.

Chemical etching can be done by immersing the piece to be etched for two or three minutes in a hot caustic soda solution or longer in a cold caustic solution.

Before finishing duralumin by chemical etching the surface should be cleaned of oil and grease. It is then dipped in a solution made up of 253 parts of sodium hydroxide to each 1000 parts of water by weight. The solution is kept in a wooden vat and is kept boiling by live steam. The duralumin to be etched is then immersed for two or three minutes after which it is washed in cold water followed by a dip in nitric acid (concentrated). The dip in nitric acid is made to neutralize any caustic remaining from the caustic dip. After the acid dip, the duralumin is washed in water again and then dried on a steam table.

Present practice in the aircraft industry does not provide for any treatment of duralumin surfaces on account of the benefit derived from the oxide film as a protective medium in itself. It is believed, however, that etching or roughening of the surface will produce the better results through the better adherence of coatings. But, on the other hand, the cost is increased by etching and it is still a matter of conjecture as to whether or not the added benefit is worth the added cost. It is believed that the better coatings will require no roughening of the surface for good adhesion.



Failure of a paint and corrosion on a duralumin float after a few months service without maintenance.

During the fabrication of a duralumin part, oil and grease deposits adhere to the surface of the metal. Unless a clean surface exists paints and varnishes cannot be effectively applied, so it is an absolute essential that a cleaning process precede the application of paint. Any product which will cut the grease and which is 100 per cent volatile will serve the purpose. Benzol, acetone, alcohol, and carbon tetrachloride are useful cleaning products. To test for a clean surface, water placed thereon will form an even film whereas if oil is still present the water will gather in globules or pools. The importance of a clean surface cannot be stressed too much, for it is this point and the application of the coating that determine the relative value of the finish.

Linseed oil and similar oils will not in themselves produce a satisfactory coating for duralumin due to the lack of durability. Oil paints using metallic oxides as pigments have been avoided on account of their weight, the possible injurious effect through electrolytic action, and on account of their non-adhering qualities. Nitrate and acetate dopes are extremely poor in adhering properly to duralumin. Bituminous solutions, varnishes and nitrocellulose lacquers present the most favorable groups for duralumin. They can be used in clear or pigmented forms to suit the demand.

As has been previously stated, any coating used must be neutral or electropositive to duralumin. Bituminous solutions, varnishes and lacquers, used clear, are inert. However, certain uses demand pigmented forms. To meet such requirements the priming coats can be clear and the outer coats pigmented without incurring any adverse action. Pigments which do not permit of a glossy surface are not recommended for aircraft due to cleaning difficulties.

Bituminous solutions on the market are many and varied. They are all of about equal value provided they are not too thin and do not harden to a brittle stage. The merits of each beyond the protective feature depend on the product.

There are two types of varnishes, namely, spar varnish, and light gravity varnish. Any varnish which does not check and deteriorate in weather gives protection to duralumin when used as a coating. The light gravity varnishes are perhaps the best for duralumin aircraft in that they remain somewhat flexible at all ordinary temperatures and form a uniform intact film.

The lacquers are outstanding in their adhesive qualities. Thin lacquers without a great many coats are not of sufficient value on duralumin to warrant the expenditure. Sufficient material should exist in the finish to give a relatively heavy body to the coating.

Mechanical Application Methods

The mechanical application of solutions, and varnishes is based on dipping, spraying and brushing on the coatings. All three methods should be practicable with a successful paint or varnish. Dipping produces a very uniform coat; spraying, a light weight coat and brushing, an easy method of application. Varnishes and lacquers should be sprayed to produce the best results. It is a very necessary part of the operation of applying the finish to see that no voids exist and that a uniform smooth coat is the result. Bubbles, no matter how small, must not be permitted.

Several thin coats are better than a few thick coats. When varnish or bituminous solutions are applied with a brush each coat should be well rubbed in so as to afford good protection with less weight. The thinning of varnishes and solutions with oil and turpentine beyond that necessary reduces their properties as protective mediums. Considerable practice and good judgment are necessary to produce the best grade of material for each operation.

Baking is a part of the application process in enamels. This baking is done at temperatures well below the annealing temperature of duralumin, so that no injurious effects to heat treated material need be expected. Baking produces a harder coating than that produced by air drying.

No less than two coats is considered advisable and the application of four coats of bituminous solution or varnish is the maximum limit for efficient results. The number of coats depends on the finished material and the service to which the duralumin is to be put, but for most purposes two or three coats produce excellent results.

A practice recently developed for duralumin aircraft consists of applying clear varnish or lacquer with a pad rubbed into the surface and left thin, followed by a coat of pigmented varnish or lacquer sprayed or brushed, followed in turn by a second coat of clear or pigmented varnish or lacquer brushed or sprayed. This combination meets weight and weathering requirements satisfactorily.

Weights of Finishes

The weights of some duralumin finishes each representing one coat dried to touch are given, as follows:

Bituminous solution	.00514 lb. sq. ft. surface
Spar varnish	.00467 lb. sq. ft. surface
Light Gravity varnish	.0023 to .0033 lb. sq. ft. surface

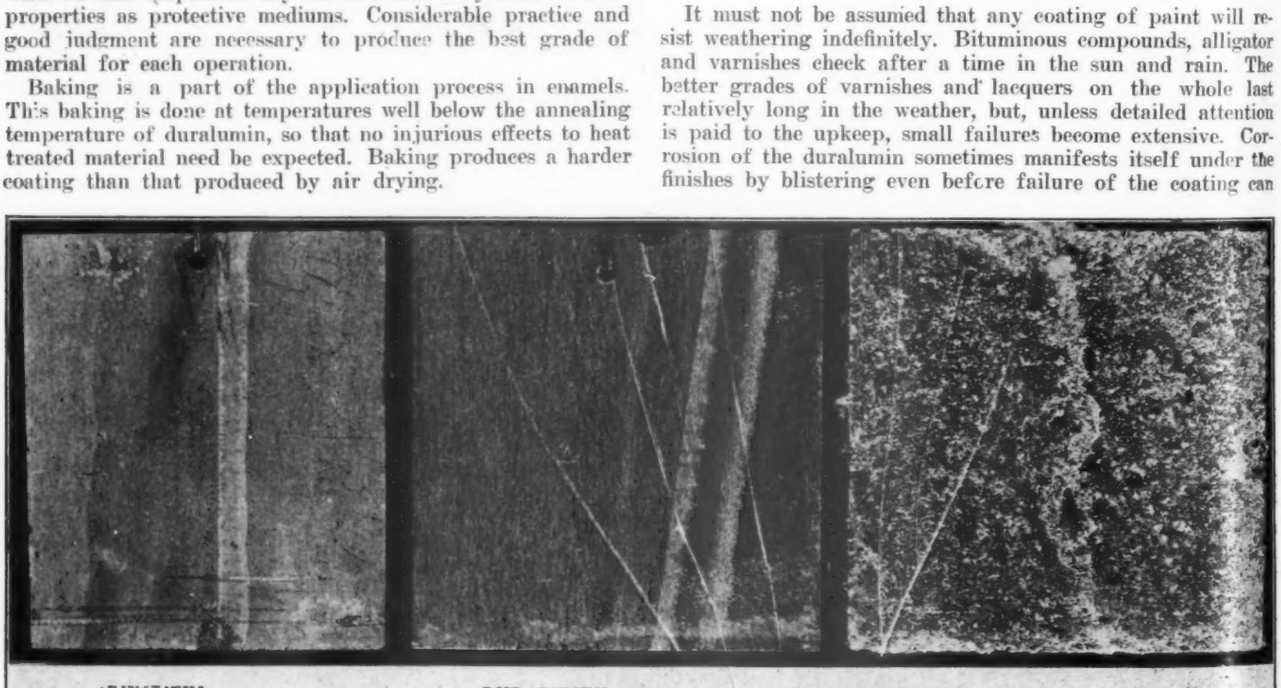
These values are for brushed coats. Spray coating is somewhat less. On material ordinarily used in the aircraft industry these are less than 1 per cent additions to the weight of the product.

Varnishes cost about twice as much as the bituminous solutions per gallon. The cost of application is about the same in each case.

To be effective in resisting mechanical treatment the finish used should never become hard and brittle. A certain amount of elasticity should prevail as long as the coat resists weathering. It should not come clean from the metal when scraped, either as a brittle chip or as a soft film; a poor grade of material, improper cleaning, or improper application produce these results. Constant attention to the maintenance of the coating is necessary. If the finish is accidently broken or worn off, the places concerned should be recoated. None of the paints or varnishes now in use will resist the mechanical treatment received in forming and manufacturing parts, so that any painting done prior to sub-assembly should not be considered intact.

Durability of Coatings

It must not be assumed that any coating of paint will resist weathering indefinitely. Bituminous compounds, alligator and varnishes check after a time in the sun and rain. The better grades of varnishes and lacquers on the whole last relatively long in the weather, but, unless detailed attention is paid to the upkeep, small failures become extensive. Corrosion of the duralumin sometimes manifests itself under the finishes by blistering even before failure of the coating can



Effect of anodic treatment in protecting duralumin specimens in the salt spray thirty days.

be seen. In these cases, the corrosion should be scraped off, the area cleaned by brushing, and touching-up resorted to. Unless this is done, increased corrosion will be the result. A life of six months for paints and varnishes subjected to weather such as is found along the seaboard is considered very efficient.

It is estimated that duralumin in aircraft should be inspected every seven to ten days for evidence of corrosion. Whenever corrosion appears on duralumin which has been painted, the corrosion should be scraped off with a knife and the spot rubbed clean of loose paint and corrosion products before any coating material is again applied. The application should be carefully done with enough coats to insure an intact film.

Bituminous solutions are somewhat resistant to acids but are readily dissolved by gasoline and such products. Bituminous solutions are worth very little as finishes where high temperatures are the rule. The varnishes and lacquers meet both difficulties mentioned to a far greater extent than solutions. Where the duralumin structure is subjected to gasoline and oil frequently, extra coats of varnish are advisable.

Coloring

To produce desired color effects on duralumin pigmented varnishes can be used over the clear varnishes. It is possible to apply certain finishing coats on bituminous solutions provided the solution is allowed to dry hard; but there is the danger in this that the bituminous solution will bleed through the finishing coat if the solution is of the best consistency for preservation, whereas it will not bleed through if the bituminous solution is hard and brittle. The hard and brittle solution does not adhere as well as the softer elastic solution.

Inside fuselages, etc. light colors are desirable to facilitate inspection and for that reason aluminum pigmented bituminous solution is superior to the clear. Varnishes and lacquers clear or pigmented with prussian blue should be used on interiors where sunlight is not direct.

It is well to mention here special paints, etc., used for special problems. The sodium silicate treatment which is found to be so efficacious in certain places consists of special cleaning of the alloy in a sodium bichromate solution, an immersion in sodium silicate solution, followed by baking and a fixing operation. This treatment, however, is more suited to castings than to rolled material.

Special enamels such as those that produce a flint-like hardness on drying are particularly useful to withstand erosion. These products should find a bigger field of usefulness as a coating for castings than for wrought alloys.

For faying surfaces of duralumin where water tightness was desired it has been the practice to use cotton fabric dipped in bituminous solutions, varnishes, or marine glue (water proof). Ordinary friction tape has also been used in this respect. For faying surfaces where gasoline tightness is an essential, gums dissolved in benzol, varnishes containing soya bean oil and litharge can be used. In all cases, the faying surfaces should be wet when made up and all interstices absolutely filled with joint material to insure a tight joint and absence of corrosion.

For faying surfaces, duralumin to any other metal or wood these same compounds can be used, but there, too, it is a matter of maximum importance to have an insulation and to have a well-filled joint. Failure to fill the joint will result in electrolytic action between the dissimilar metals.

Plating

The plating of duralumin can be done in two ways; namely, by electrodeposition of another metal on it and by spraying a metal on the duralumin. The deposit of another metal on duralumin by electroplating is an exceedingly difficult proposition due to the lack of adhesion obtained. Nickel and zinc can be deposited on duralumin with success by methods for the most part patented. Chrome plating on aluminum alloy castings has been done, but it is not yet available for rolled material. It must not be expected that these platings can be deposited on other than individual parts, for the matter is still quite limited in application.

To make any metal stick to duralumin it is necessary to break down the oxide film. This is done as a rule by sand or steel grit blasting. Metallic aluminum deposited by means of a spray gun on such a prepared surface is extremely effective in maintaining the strength of the plated material in corroding mediums. This process should have wide application.

There has been developed another process somewhat similar to the electroplating operation which appears to be of value. This is the so-called anodic-oxidation process applicable to aluminum alloys in general. The process consists primarily in building up the aluminum oxide film on the part concerned to the point where its dissolution by corroding mediums is a matter of extended time. The duralumin piece to be oxidized is made the anode in a low percentage chrome solution and varying voltages and currents are applied until the film has been suitably built up. The effect on the weight of the part is to reduce it slightly. The mechanical properties are also slightly reduced indicating a reduction in the effective metal through oxidation. The film produced on duralumin is very uniform and practically continuous, and the resistance to corrosion displayed by anodically treated material is distinct and of outstanding merit. The process has not yet been carried to assemblies but it appears that this is practicable. The main difficulty with the anodic treatment will be in producing a continuity of the oxide film. Parts will have to be treated after the forming operation, for there is a tendency to break the finish in case of any other than minor bends.

Although the anodic oxidation treatment can be used as the sole finish it is believed that the lack of continuity of the film will require the application of some paint or varnish on the material to insure satisfactory results. The combination, however, should be outstanding as a corrosion resistant protection.

Other Protective Methods

There are two or three other means of finishing duralumin which have their merits in staving off corrosion somewhat. The most interesting one of these is polishing and buffing. Polishing and buffing duralumin to a high degree can be used as a permanent finish where the corroding mediums are not particularly active and where the mill run material cannot be used without a protective coating of some kind.

A dip in nitric acid solutions has a tendency to retard corrosion but the degree of resistance is not sufficient to warrant a high rating.

Oxidation by thermal means is another possibility which has not yet emerged from the laboratory but which warrants consideration for use on aluminum alloy wires.

The matter of protecting duralumin against corrosion should still be regarded as in its infancy. Much work remains to be done along constructive lines to permit a very general use of the metal. Every measure within reason looking to prolong the life of duralumin in aircraft should be undertaken until the protection of this material is fully understood. It can be expected that the durability will be affected unless precautions are taken from the time of manufacture of the duralumin throughout its career. The protection of duralumin aircraft should be carefully considered in the design, construction and maintenance for maximum degree of success.

C. A. M. 9 Schedule Changed

W. Irving Glover, Second Assistant Postmaster General, has just announced frequency changes in flying schedules on the air mail route extending between Chicago and St. Paul and Minneapolis, Minn. The changes were made necessary because the airway on this route is not lighted at night and only daylight flying is possible.

The change, which became effective on Oct. 21, is as follows:

Leave Chicago, 5.50 a. m.; leave Milwaukee, 6.50 a. m.; leave St. Paul, 10.30 a. m.; arrive Minneapolis, 10.40 a. m.

Leave Minneapolis, 2 p. m.; leave St. Paul, 2.10 p. m.; leave La Crosse, 3.30 p. m.; leave Milwaukee, 5.25 p. m.; arrive Chicago, 6.15 p. m.

Same frequency as heretofore.

Underwood & Underwood

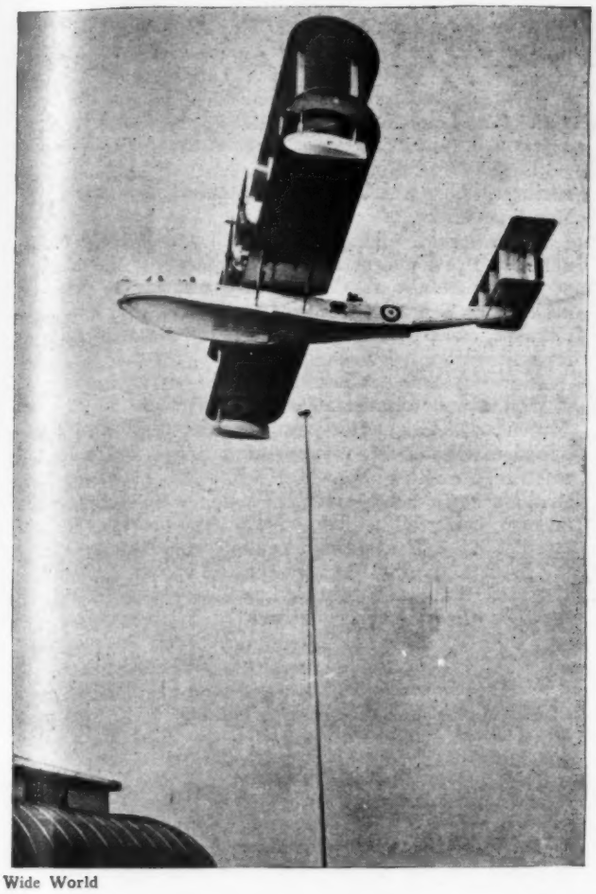
Herbert Photos

(Top) *EMULATING NATURE. The Bonney Gull which is designed from the average dimensions of a number of seagulls caught by L. W. Bonney of Long Island, N. Y. The body is of wood and the wings of metal. The latter fold up close to the sides of the fuselage. The machine is said to have been flight tested satisfactorily.*

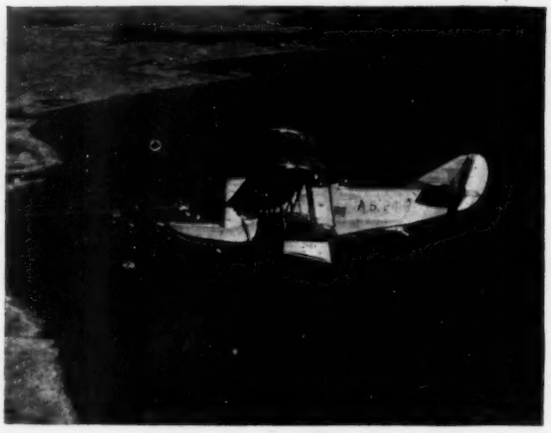
(Left) *ALL-METAL. A new all-metal flying boat being constructed by the Dornier company of Germany to carry eight passengers. The picture is of interest, indicating the almost flat bottom of the hull which is somewhat unusual.*

(Right) *AERIAL POLICE. A view of the police exhibition in Berlin, Germany, showing in the foreground one of the Junkers monoplane mounts of the German airplane police. Recent announcements to the effect that an aerial division was being created in the Philadelphia police force make this photograph all the more interesting. Incidentally, the presence of what is obviously a glider in the middle distance is not altogether understandable in an exhibition of this nature. The road traffic towers and signal lights for controlling the less angelic of modern travelers will also be seen.*

Herbert Photos



Wide World

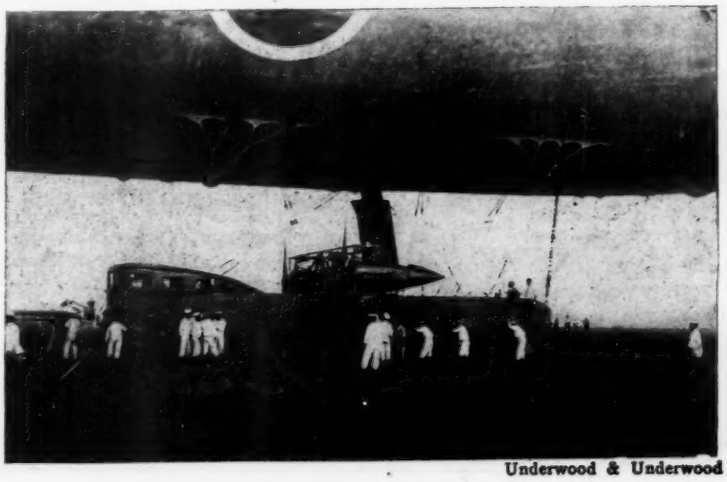


(Top) *AN ENVOY OF FRIENDSHIP TO THE SOUTH. A Loening Amphibian (inverted Liberty), five of which are shortly to leave San Antonio on a flight of 18,500 miles into South America to be carried out by Air Corps officers under Major H. A. Dargue.*

(Left) *NAVAL RECONNAISSANCE. One of the latest additions to Great Britain's air fleet. The Blackburn Iris long range patrol seaplane said to be the fastest seaplane in the Royal Air Force. The machine is equipped with three 650 hp. Rolls Royce Condor III engines and carries a crew of five. During recent tests it was demonstrated to be capable of flying, climbing, and executing turns in either direction with any one of its engines completely shut off.*

NEWSPAPER ENTERPRISE. The three Albatros L-72a planes owned by the B & Z Mittag (noonday) newspaper of Berlin and used regularly for deliveries in German provincial towns.

AERIAL JAPAN. A large non-rigid airship recently tested in Japan. No details are available concerning the ship with the exception of the fact that the car is heavily armored. Close examination of the photograph reveals the existence of a gun of no small dimensions directly in the bow of the car and low down below the navigation windows. As will be seen, the ship is driven by two engines.



Underwood & Underwood

The Pitcairn Sesqui-Wing

A Three-Seater Commercial Plane Arranged for Quick Interchange of Engines.

THE SEQUI-WING was built to be used as a fast messenger plane for carrying express, photographs, moving picture films, newspaper photographers or reporters, or in any emergency requiring a plane with a high cruising speed. At its cruising speed of 120 m.p.h. the plane will fly for 3 hr., giving a range of 360 miles, while at its maximum speed of 145 m.p.h., the gasoline supply is sufficient for a 2 hr. flight, giving a range of 290 miles. While either a Curtiss OX-5, a Curtiss K-6, or Curtiss C-6 engine may be used, the C-6 is standard equipment.

Fuselage

The fuselage skeleton follows the Pitcairn practice of using a trapezoidal section and is welded up of chrome molybdenum steel tubing. The Pratt type of trussing is used for the upper and lower longerons, and the Warren type to connect the two. Brace cables are used only in the engine mount, being replaced in the fuselage proper by Vee bracing of good sized tubes or by cross bracing of ¼ in. tubes. The engine mount is a separate structure, fastened to the fuselage with steel pins, which are held in place by heavy steel rings. Engine bearers are round steel tubing welded into the mount. In order to insulate the fuselage from engine vibration, brake lining is used between the engine foot and the bearer, and the engine holding bolt passes through a helical spring. The fuselage tapers to a very narrow vertical Vee, to the top of which the rear beam of the stabilizer is bolted, and to the lower end of which a short stud skid is fastened to protect the rudder in case of breakage of the tail skid.

The landing gear is of the Vee type with through-axle. The Vees are welded up of chrome molybdenum streamline steel tubing, which makes a light and very strong type of construction. Cast bronze blocks are used to bolt the Vees to the fuselage. The wheels are 26 in. x 4 in. and are faired with aluminum disks.

The tail skid is laminated of ash and is hung on a swivel mount. Provision is made for operating the skid in conjunction with the rudder, in case a steerable skid is found desirable. The tail skid installation follows the usual Pitcairn practice, its main features being accessibility and quick replacement

The wing structure is of the single bay biplane type with a pronounced overhang. The upper panels are bolted to a 'tripod', which is welded up of streamline steel tubing and bolted to the fuselage. The lower panels are bolted directly to fittings on the lower longeron. The N-shaped interplane struts are welded up of streamline steel tubing, the outer member being adjustable. An adjustable intermediate strut completes the W-system of center panel bracing and reduces the inboard span of the upper panel spars. Streamline wires are used throughout, the flying wires being double and the landing wires single. The wings are set at 0 deg. incidence and 0 deg. dihedral.

The unbalanced ailerons are hinged directly to the rear spar. The control cables run from a horn on the under side of the aileron to the lower wing and along the nose to a sector in the fuselage. Ball bearing pulleys are used in the control system.

Tail

A set of Curtiss Oriole tail surfaces is employed, specially modified for the Sesqui-Wing, the area being reduced and a steel cable trailing edge substituted for the U-shaped steel edge. The two halves of the stabilizer are fastened together permanently and the fin is built to it. The stabilizer is adjustable on the ground between + 2 deg. and — 2 deg. and the

The Pitcairn Sesqui-Wing with Curtiss C-6 engine

fin is offset to balance the effect of engine torque. The fin is braced to the stabilizer with streamline wires, and the stabilizer to the fuselage with hard cables.

The Oriole controls are used for the Sesqui-Wing, with a few modifications. The stick and rudder bar in the front cockpit are omitted entirely, but the rest is maintained. Cables run from the rudder bar and stick direct to the rudder and elevator horns.

Accomodations

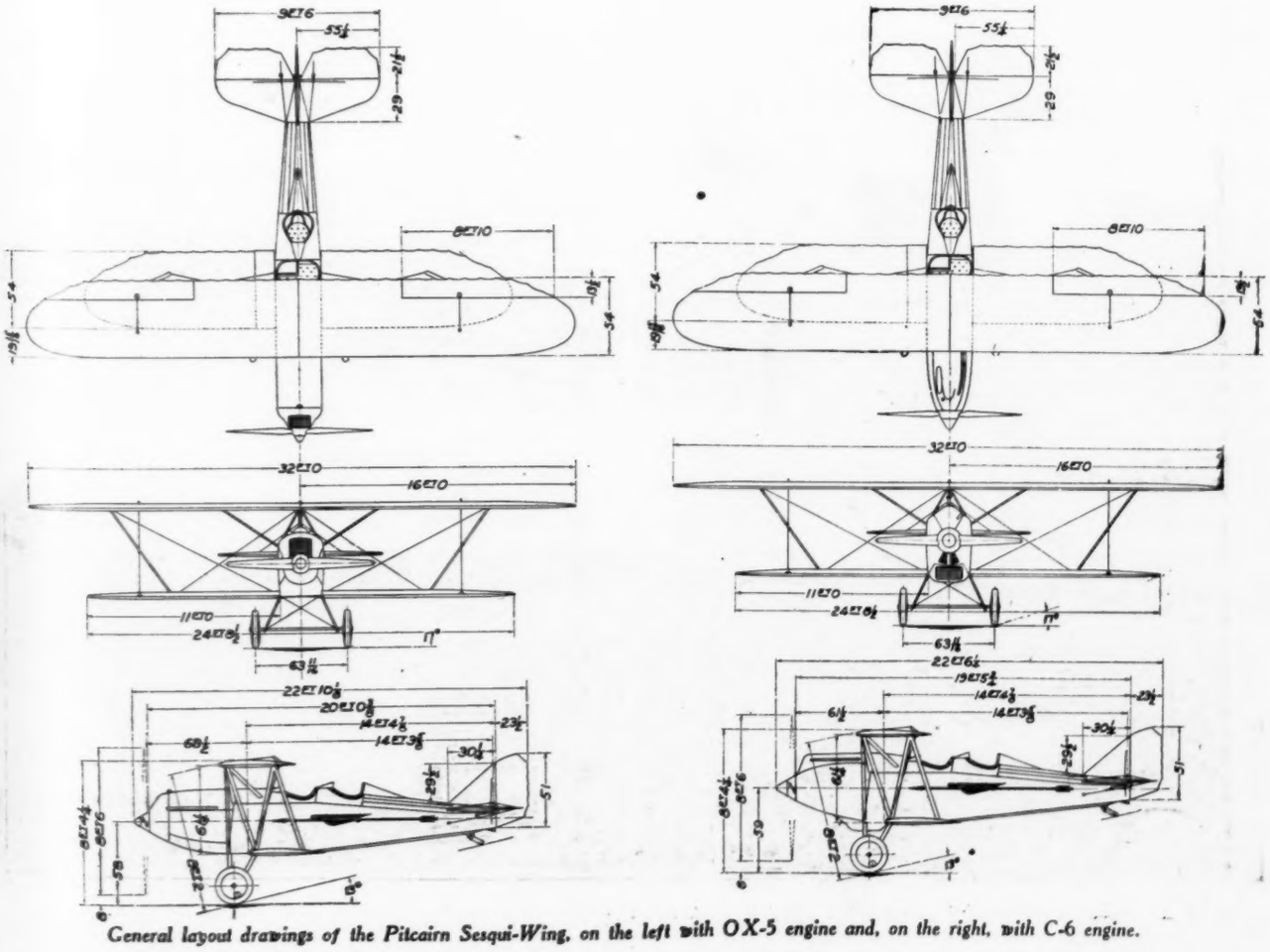
The passenger cockpit is located just under the trailing edge of the upper wing with the pilot's cockpit behind. Due to the narrowness of the fuselage, the passengers' seats are staggered, the one on the right side being 8 in. forward of the one on the left. The edges of both cockpit openings are upholstered. A wooden floor is installed in the passengers' cockpit, but heel-plates only are used at the pilot's seat. Cushions are fitted to both seats and backs. Entrance to the pilot's cockpit is from the left side by means of a streamline step welded to the fuselage. Windshields are of celluloid and are made as small as possible without endangering the comfort of the occupants. A head rest is provided for the pilot.

The following instruments are installed in the pilot's cockpit: tachometer, engine switch, oil pressure gauge, oil and water thermometers, and altimeter. The plane is fabric covered and the Pitcairn color scheme of black and yellow has been carried out. An exceptionally fine finish on the fuselage covering by using Pittsburgh Plate Glass Company's "Minax", which was sprayed directly on top of four coats of clear dope. By rubbing the final surface, a finish similar to that of an automobile was produced.

In order to increase the serviceability of the Sesqui-Wing both the OX-5 and the C-6 engines have been installed, as mentioned above. Two separate engine mounts were built and everything necessary for the functioning of the engine was attached thereto. The C-6 installation follows the Pitcairn Fleetwing practice very closely, being improved in those details which experience with the Fleetwing showed could be simplified. The radiator has been moved back between the front struts of the landing gear Vees to allow it to operate at its maximum efficiency and to reduce the fin area of the nose to a minimum, but primarily to allow of better oil cooling. A tunnel has been built into the fuselage behind the radiator and louvers have been cut into the nose of the cowling behind the propeller to insure proper cooling of both water and oil. The water expansion tank is fastened to the engine, so that the entire water system is complete for detachment.

Engine Controls

Engine controls are run to a torque tube across the fuselage just ahead of the firewall and only one clevis pin has to be removed for the engine change. The oil pressure line is broken near the firewall and the ignition wires are run to a Kliegl Stage Connector which can be readily pulled apart. The thermometer bulbs have to be removed from the engine or the radiator as the case may be and replaced in the other engine or radiator. The gasoline system presented some difficulties inasmuch as the C-6 engine cannot be gravity fed from a tank in the fuselage as the OX-5 can, but this problem was solved by installing a 3-unit Auto-Pulse Electric Pump with a capacity of from 24 to 30 gal. an hour and breaking the gasoline line at the outlet from the strainer. This pump was driven from a Columbus 6-volt hot shot battery and functioned perfectly at the National Air Races, where the Sesqui-Wing did a great deal of flying. To guard against the possibility of a spark jumping from the pump



General layout drawings of the Pitcairn Sesqui-Wing, on the left with OX-5 engine and, on the right, with C-6 engine.

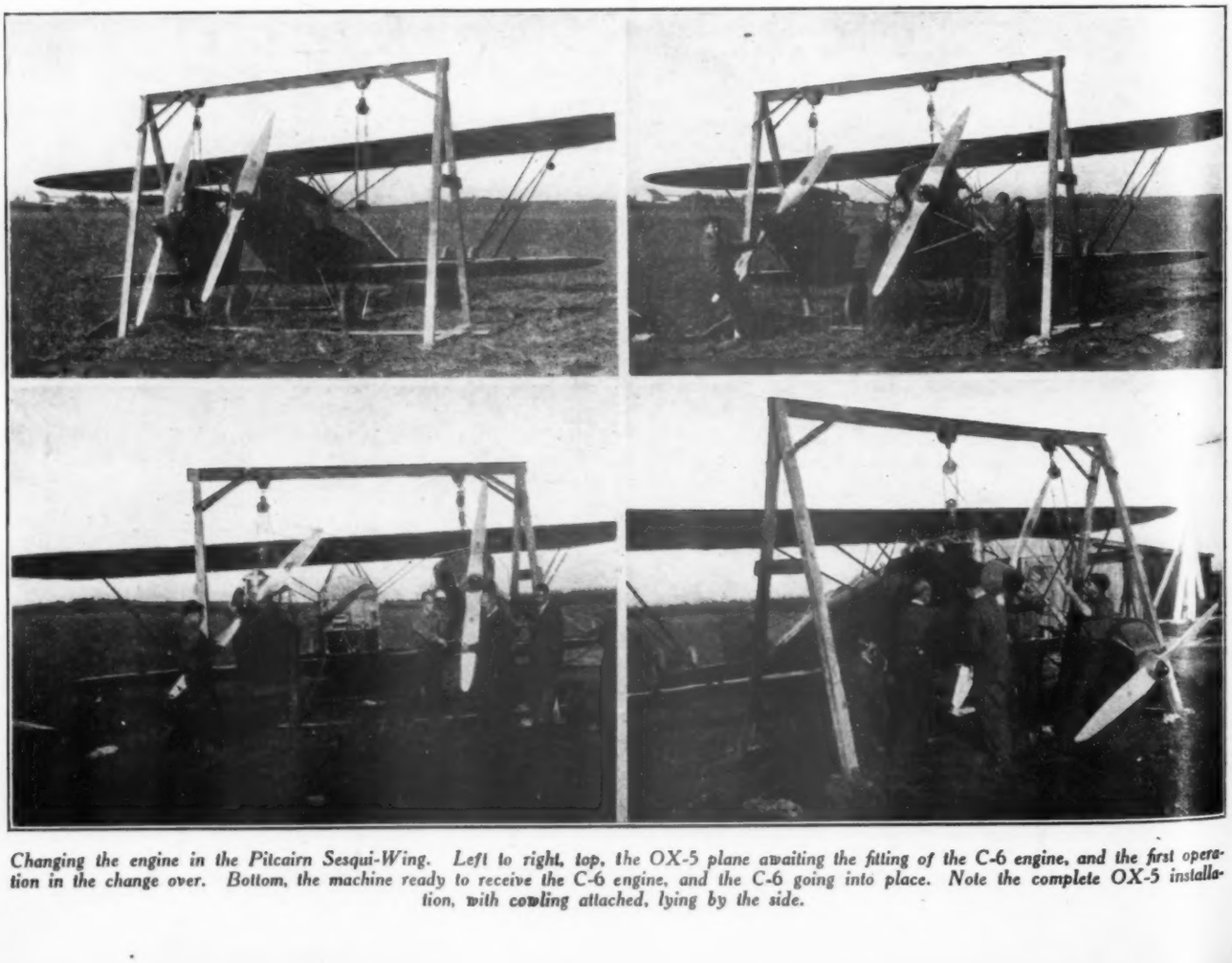
The Pitcairn Sesqui-Wing (Curtiss OX-5 or C-6)

to the firewall, a piece of sheet fibre was placed between the attaching lugs of the pump and the firewall. A 4-"Gal. gravity tank in the upper panel was used as a reserve tank, the electric pump delivering the gasoline directly from the main tank in the fuselage to the carburetor. An emergency hand pump was also installed in the pilot's cockpit and operated through the gravity tank, but this pump has not been required.

The Engine Change

During the Races, in order that the plane might enter both the low power class and the speed races, arrangements were made for the changing, within as short a space of time as possible, of the engine. The change from the C-6 to the OX-5 was made in a remarkably short time. On Wednesday, Sept. 8, the Sesqui-Wing was entered in two races, the first with the OX-5 engine and the second with the C-6. Only 1½ hr. time was allowed for changing the engines and this was further shortened by the fact that it was desired to run propeller tests with the C-6 engine at the Pitcairn factory 25 miles North of Model Farms Field.

The plane left the flying field near the factory about 12:15 p.m., arrived Model Farms Field a quarter-of-an-hour later, and taxied up to the scene of the engine replacement. A traveling scaffold had been erected on the field, the wooden framework supporting a steel I-beam on which ran two hand-operated hoists, one being empty to receive the C-6 engine in the plane, the other supporting the OX-5 engine with all necessary accessories. The Standard Steel Propeller on the



Changing the engine in the Pitcairn Sesqui-Wing. Left to right, top, the OX-5 plane awaiting the fitting of the C-6 engine, and the first operation in the change over. Bottom, the machine ready to receive the C-6 engine, and the C-6 going into place. Note the complete OX-5 installation, with cowling attached, lying by the side.

C-6 Sesqui-Wing came to rest at 12:34 p.m. and at 1:05 p.m. just 31 min. later, the Curtiss-Reed propeller on the OX-5 was being turned over by hand, preparatory to starting the engine. Due to engine trouble, the OX-5 Sesqui-Wing did not finish the race, so the plane was brought back to the field and the C-6 engine substituted for the OX-5 in 45 min.

The most noteworthy feature of the OX-5 engine installation is the radiator, a combination of nose type and sloping core tunnel type. It is mounted over the long nose of the OX-5 engine just forward of the cylinders. Large louvers are placed on the top, sides, and bottom of the cowling near the rear edge to insure the maximum air flow. The control to the OX-5 carburetor is connected to the same torque tube on the fuselage to which the C-6 controls run, to a lever placed to receive the control rod. The oil pressure line is connected by the same union and the ignition wires by the same Kliegl Stage Connector as on the C-6. The same thermometers are used on both engines, and the gasoline is connected to the same strainer. A Curtiss-Reed propeller is used with the OX-5 and a Standard Steel Propeller with the C-6.

General Details

The general characteristics of the Pitcairn Sesqui-Wing, together with the manufacturer's figures of performance are as follows:

	C-6	OX-5
Span, upper wing	32 ft. 0 in.	32 ft. 0 in.
Span, lower wing	24 ft. 8½ in.	24 ft. 8½ in.
Chord, both wings	54 in.	54 in.
Gap	61¼ in.	61¼ in.
Stagger	19 15/16 in.	19 15/16 in.
Incidence, both wings	0 deg.	0 deg.
Dihedral, both wings	0 deg.	0 deg.
Length overall	22 ft. 6¼ in.	22 ft. 10⅛ in.
Height overall	8 ft. 4¼ in.	8 ft. 4¼ in.
Weight empty, with water	1432 lb.	1370 lb.
Useful load	754 lb.	746 lb.
	C-6 OX-5	
Passengers	340 lb. 340 lb.	
Pilot	170 lb. 170 lb.	
Gasoline	204 lb. 204 lb.	
Oil	40 lb. 32 lb.	
Weight loaded	2246 lb.	2116 lb.
Area of wings	219.8 sq. ft.	219.8 sq. ft.
Area of horizontal tail	28.5 sq. ft.	28.5 sq. ft.
Area of vertical tail	10.4 sq. ft.	10.4 sq. ft.
Power, hp./r.p.m.	160/1750	90/1400
Wing loading, lb./sq. ft.	10.22	9.61
Power loading, lb./hp.	14.05	23.50
Wing section	C-62	C-62
Performance		
Maximum speed	145 m.p.h.	120 m.p.h.
Cruising speed	120 m.p.h.	—
Minimum speed	60 m.p.h.	60 m.p.h.
Service ceiling	20,000 ft.	15,000 ft.
Cruising range	360 miles	—
Endurance at cruising	3 hr.	3 hr.

Characteristics of Float Seaplanes

A report dealing with seaplane characteristics under the title, "Characteristics of a Twin-Float Seaplane During Take-off", by John W. Crowley, Jr. and K. M. Ronan, has recently been issued by the National Advisory Committee for Aeronautics.

At the request of the Bureau of Aeronautics, Navy Department, an investigation was made by the Langley Memorial Aeronautical Laboratory of the National Advisory Committee for Aeronautics, of the planing and getaway characteristics of three representative types of seaplanes, namely: single float, boat, and twin-float. The experiments carried out on the single float (Reference 1) and boat (Reference 2) types have been reported on previously. This report covers the investigation conducted on the twin-float seaplane, the DT-2, and includes, as an appendix, a brief summary of the results obtained on all three tests.

The fundamental take-off characteristics of the DT-2 seaplane (twin-float) are similar to those of the N-9H (single float) and the F-5L (boat type). At low water speeds, 20 to 25 m.p.h., the seaplane trims by the stern and has a high resistance. Above these speeds, the longitudinal control becomes increasingly effective until, with a gross load of 6,000 lb. it is possible to get away at angles of attack of 8 to 14 deg. with corresponding speeds of 56 to 46 m.p.h. It was further determined that an increase in the load caused little if any change in the water speed at which the maximum angle and resistance occurred, but that it did produce an increase in the maximum angle.

A copy of this report, No. 242, may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

Power Output of Two-Stroke Engine

N.A.C.A. Report 239, covering Power Output and Air Requirements of a Two-Stroke Cycle Engine for Aeronautical Use, compiled by C. R. Paton and Carlton Kemper, is the result of an investigation undertaken by the National Advisory Committee for Aeronautics at its research laboratory, Langley Field, Va. The purpose of the investigation was to determine the pressure and amount of air necessary for satisfactory high-speed, two-stroke cycle operation, and thus permit the power requirements of the air pump of blower to be determined. Assembly and development of the apparatus and preliminary work in connection with the fuel-injection system were done under the direction of Robertson Matthews.

Another object of this investigation was to determine the pressure and amount of air necessary for satisfactory scavenging and operation of a high-speed, two-stroke cycle engine for aeronautical use, a 5 by 7 in. single-cylinder Liberty test engine being adapted for the purpose. The fuel and scavenging system consisted of a fuel-injection pump and injection valve, used in conjunction with a separately driven Roots type blower. Tests were conducted at speeds of 1,000, 1,200, and 1,300 revolutions per minute, with air-supply pressures from 2 to 6 lb./sq. in. guage, and results show, that 53 brake horsepower could be developed at 1,300 revolutions per minute, with a scavenging air-pressure of 5.5 lb./sq. in., a specific air consumption 9 lbs./b. hp./hr., and a specific fuel consumption of 0.61 lb./b. hp./hr. Under these conditions 3 hp. was required to supply the air, resulting in net power output of 50 brake horsepower. A minimum specific air consumption of 8.4 lb./b. hp. was obtained at this speed with an air-supply pressure of approximately 3.5 lb./sq. in. when developing 41 brake horsepower. Chattering of cam-operated exhaust valves presented higher speeds.

Based on power output and air requirement here obtained the two-stroke cycle engine would seem to be favorable for aeronautical use. No attempts were made to secure satisfactory operation at idling speeds.

A copy of this report may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

Rohrbach Airplanes for Turkey

Several airplanes, manufactured in the Rohrbach metal airplane factory at Copenhagen, have recently been shipped to Constantinople, according to a report to the Department of Commerce from Commercial Attache H. Sorensen, Copenhagen. These shipments represent part of an order placed during the past Summer for seaplanes for the Turkish army.

The Danish factory is sending one of its officials and a number of workmen to Turkey for the purpose of assembling the machines. A pilot from the factory will then fly the machines from Constantinople to Smyrna where the Turkish military airdrome is located.

Norwegian Planes to Fly to London

The Aero Club of Norway is planning trial flights between Oslo and London with a view to establishing a regular air service. The route will probably lie over the Skagerak and follow the Danish, German and Dutch coast lines. Flights are expected to take about 7 hrs. in Dornier-Wal or Fokker planes. The Norwegian Department of Commerce has contributed a 5,000 kroner subsidy for experimental purposes. There are already three companies (Swedish, Danish and Dutch) operating airplanes from Malmo.

The Practical Lightplane

By Jack Laass

For a long time American lightplane enthusiasts and sportsmen of aviation have read accounts and descriptions of lightplane activities in England, France, Germany and other foreign countries. After each story the thought comes, "Why doesn't the United States become interested in these little airplanes?" Thousands of young men interested in aviation and its various sub-divisions really are interested, not in a tiny plane for races only, but in a machine that will fly stably and safely at a cruising speed of about eighty miles per hour and do fifteen miles per gallon of gasoline with a three hour flying radius. An economical airplane of these characteristics has a big market. Especially is this apparent after the interest shown in the Driggs Dart during the Ford Reliability Tour and the National Air Races at Philadelphia.

Being the pilot of this faithful little airplane in both of these nationally known events, I feel qualified to discuss these small machines. The plane was designed by Juan Driggs, of Dayton, Ohio, who is, without a doubt, one of America's premier lightplane designers. Three of these little airplanes have been built. The first one, "The Bumble Bee", was built three years ago in the factory of the Johns

The little Driggs Dart (Wright Morehouse, 35 hp.) flown by Jack Laass

Flying Service, Dayton, Ohio. It is powered with a stock Henderson motorcycle engine, the only change in the engine being the installation of a thrust bearing. The engine, not being built for aircraft use, is somewhat heavy per horsepower but, nevertheless, gives the machine creditable performance.

The second Driggs lightplane, with a number of refinements and improvements and powered with the Wright Morehouse engine was sold recently to the Army Air Corps and went to the Engineering Division, McCook Field. The third plane, with still more improvements suggested by experience was built with the specific intention of entering it in the Reliability Tour and the National Air Races.

The policy of "better planes" has ruled in the construction of these machines, the result being excellent flying qualifications in all three planes, especially the Dart, the last machine constructed.

The fuselage of the machine, which is 19½ ft. long, is of tubular steel construction with three longerons arranged in triangular form. The cockpit is totally enclosed with transparent pyralin, the cantilever wing being supported on steel tubular struts, with the main longerons of the fuselage at this point, over the pilot's head. A circular pyralin window to give the pilot a good view upwards, is arranged in the wing section directly over his head. Entrance to the pilot's cockpit is by means of a hinged door with quickly detachable release.

The wing construction is of laminated spruce spars, entirely covered with veneer. There are two 3½ gal. gasoline tanks in the wing which give a gravity feed to the engine through a strainer. The engine is mounted upon wooden bearers and the vibration is reduced to nil. Loaded, the machine weighs 319 lb. Its wing span is 27 ft. and total length 19½ ft.

The stability of the machine is excellent and no hardship is experienced in piloting the plane even in the severe rain storms encountered during the Reliability Tour and in crossing the Allegheny Mountains on the way to Philadelphia for the Air Races. The most undesirable flying weather was encountered during the Reliability Tour, including rains, fog and low clouds, and extremely muddy flying fields. The little Dart went through all this with its bigger brothers of the air and was only stopped at St. Paul by a broken crankshaft, something that is likely to happen to any new engine. The fact that the Dart could stand these severe tests, including long hops in adverse weather, rough muddy fields, and the steep climb necessary in crossing the high peaks of the Alleghenies at an average speed of 80 m.p.h., gives great confidence in this type of airplane. The gasoline consumption is 26 miles per gallon.

The closed five mile course at Model Farms Field, Philadelphia reduced the speed of the Dart by about 10 m.p.h., yet the speed for the three races in which the Driggs Dart participated was 85.6 m.p.h. In the race for the Daily News Trophy, planes were required to climb to 500 ft. at the first pylon from a standing start, coming down to 60 ft. at the other pylons. Not a bit of trouble was experienced in doing this in the Dart, nor was there any sign of engine trouble.

It is interesting to point out that, even during the vertical banks around the pylons in the races, there was no sign of wing flutter, which is an important point when the span (27 ft.) of the single cantilever wing is recalled. The little plane, in fact, has been stunted as severely as are the military pursuit planes.

With all these points and considerations in mind there is little doubt in the coming future of the lightplane. The ruggedness and serviceability of this particular plane, together with the several other excellent lightplanes which have been developed, adequately demonstrate that America has produced airplanes in the lightplane class which are equal to, and perhaps even better than some of those developed abroad.

New N.A.A. Committee Appointments

Porter Adams, president of the National Aeronautic Association, has recently announced the following committee appointments in the N.A.A. organization for the coming year:

EXECUTIVE COMMITTEE

Chairman, Hollinshead N. Taylor; Wm. H. Gannett; John J. Bergen; Maj. James A. Meissner; Glenn L. Martin; Thos. F. Hamilton; Gould Dietz; J. Don Alexander; Donald Douglas.

MEMBERSHIP COMMITTEE

Chairman, John J. Bergen; Carl H. Wolfley; Glenn L. Martin; Orville Wright; C. G. Peterson; E. S. Gorrell; J. Don Alexander; Wm. B. Stout; Irving W. Bullard; Carl B. Fritsche; Howard Nichols; H. Ralph Badger.

CONTEST COMMITTEE

Chairman, Orville Wright; vice-chairman, George W. Lewis; Porter H. Adams; Brig. Gen. F. P. Lahm; secretary, C. F. Schory; Brig. Gen. W. E. Gillmore; C. T. Ludington; Newton H. White; Glenn L. Martin; C. G. Peterson; B. Russell Shaw; Hon. E. P. Warner.

FINANCE COMMITTEE

Chairman, Godfrey L. Cabot; vice-chairman, Col. B. F. Castle; Howard Coffin; Col. E. A. Deeds; John J. Bergen; Edsel Ford; F. B. Patterson; Hollinshead N. Taylor.

LEGISLATIVE COMMITTEE

Chairman, Hon. Wm. P. MacCracken, Jr.; vice-chairman, John F. Victory; Hon. Melvin M. Johnson; Carl H. Wolfley; Harold F. Pitcairn; Noel Davis, Clarendon; Clarence M. Young; Judge Wm. P. Cary.

FOREIGN RELATIONS

Chairman, Sidney B. Veit; Cortlandt F. Bishop; Dr. A. L. Hipwell; John J. Ide; F. S. Lahm; Elmer A. Sperry; Maj. B. K. Young.

PROGRAM COMMITTEE

Chairman, Harry Block; James A. Campbell; Grover Loening; Moorehead Wright; H. J. Wilson.

PUBLICITY COMMITTEE

Chairman, Col. C. deF. Chandler; Earl N. Findley; Daniel Rochford; Ralph W. Cram; Thomas R. Shipp; Frederick R. Neely.

HONORARY MEMBERSHIP COMMITTEE

Chairman, Frederick B. Patterson; Howard E. Coffin; Brig. Gen. F. P. Lahm; Godfrey L. Cabot; C. W. Seiberling.

CIVIC ORGANIZATION

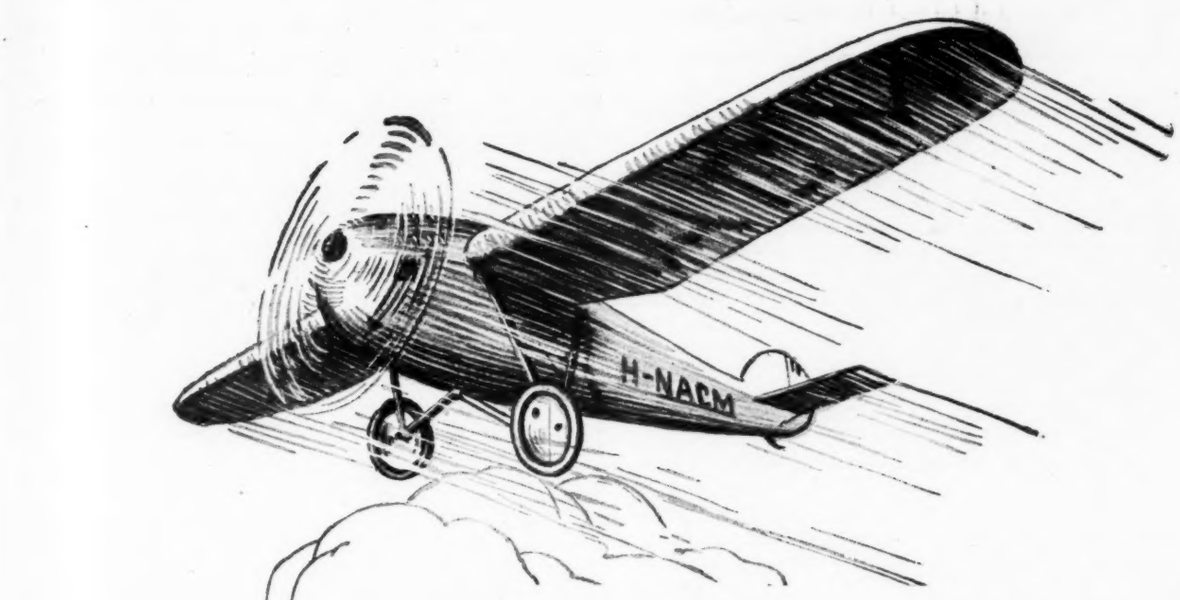
Chairman, Carl H. Wolfley; Bernard Weisman; Donald E. Keyhoe; Millburn Kusterer; Arthur J. Lynch.

PUBLICATIONS COMMITTEE

Chairman, L. S. Horner; C. G. Peterson; C. T. Ludington; W. H. Gannett; John Ahlers; Charles L. Lawrence; Col. B. F. Castle.

AIRWAYS AND LANDING FIELDS

Chairman, Charles Kunkle; Chance M. Vought; Crawford Ellis; A. W. Van Valkenberg; Maj. R. W. Schroeder; Maj. T. C. Macaulay.



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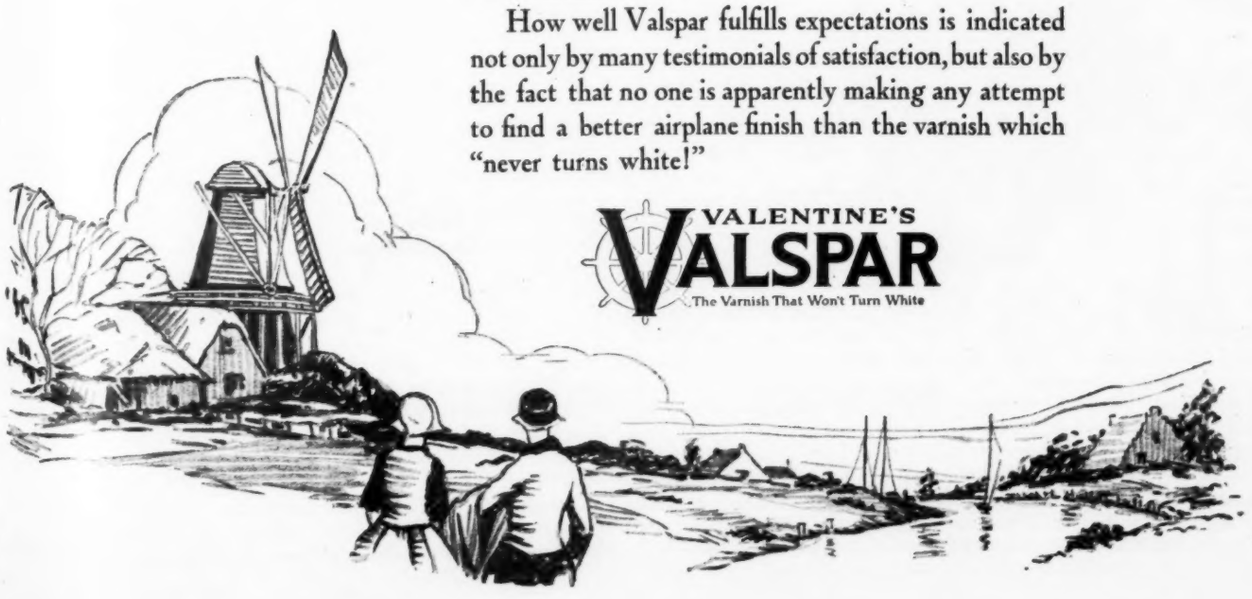

Side Slips

By Robert R. Osborn

It is really too bad, with the limited time and space at our disposal each week, that so much of both should have to be spent in an apparently futile attempt to improve the newspapers, as far as aeronautical subjects are concerned. For a long time the news writers would not let the Los Angeles go on a trip anywhere but that she had to fight a gale or a storm every foot of the way. The big ship couldn't even be taken from her hangar to a mooring mast a few hundred yards away without being blown hundreds of miles off her course. After we pointed out to them that we had been in the immediate vicinity during several of these flights and had failed to observe any one of the dozen gales blowing, they finally broke down and admitted that there really weren't any storms at all, but that they were just short of copy those days. About ninety per cent of the papers have completely reformed and have lately allowed the Los Angeles to fly in calm weather occasionally.

Then, during the rush of news about the North Pole flights the reporters became hopelessly entangled in the technical terms involved in the business, and in the course of a single article a ship might be referred to indiscriminately as a blimp, biplane, dirigible and hydro-airship. We never did get that mess straightened out but no one can say we didn't try.

After all of this we thought we'd let the newspapers go, as impossible of improvement, but for the good of the industry we've decided to make another attempt at it. Their latest offense, which is arousing our editorial ire, is the use of an increasing number of headlines like these—"Vast Crowds in Mid-Western Cities Cheer Los Angeles", "Crowds Cheer Winners at Air Races" and "Throng Cheers Opening of New Air Mail Route". In our time we've seen the Los Angeles fly over vast crowds and big cities, attended a few air races, and witnessed the opening of an air mail route or two, but listen as hard as we have, we've never heard a cheer. It is about time these papers started to practice some of the great accuracy of which they boast, coming out with headlines like these: "Airship Flies Over City. Most of Citizens Watching Subway Under Construction" or " Dumb Crowd at Races Fails to Appreciate Good Flying."

* * * *

On a Friday, at the Air Races in Philadelphia, we went into the press box to visit a friend who is a reporter for a big Philadelphia paper. He showed us an article he was turning out on his typewriter, the last lines of which were to this effect—"Now the great Los Angeles, with flags flying, rises gracefully from the ground, circles the field twice amidst the cheers of the excited crowd, and is fast becoming a mere speck in the distance." As a matter of fact, there was only one flag we could see, the ship didn't circle the field at all, there were no cheers, and at the time the article was completed and dispatched to the paper, the ship hadn't even left the ground.

* * * *

A friend, who heard a well-known airplane designer speak at a recent meeting in New York, quotes him as having said that one reason no lower wing was used in his monoplanes, was because passengers unaccustomed to regular flying became dizzy when the lower wing allowed them to appreciate the altitude at which they were flying. We hesitate about disagreeing with or discouraging so prominent an engineer, but we must report that the comfort of his passengers is still not completely assured. We had one ride in his newest cabin monoplane and most of the passengers were getting dizzy trying to see the wing from their windows, to make sure that it was still attached to the cabin and functioning properly.

In a recent article on the subject of gambling in "Liberty" magazine, we find—"Gambling is an age-old means of escape from drab life. It is a device whereby those of low sensitivity and stunted imagination set up artificial hazards in order to get a kick out of life."

This is the first logical explanation we have found of the more or less continuous poker game participated in by the pilots at some of the flying fields.

Series of Aeronautical Conferences End

The seven conferences held by the aeronautical branch of the Department of Commerce with officials of the flying world have been well attended and mutual co-operation between the department and the commercial operators, manufacturers and insurers is assured, according to Assistant Secretary of Commerce for Aeronautics, William P. MacCracken Jr.

The purpose of these conferences was to discuss the proposed air rules and regulations of the department. There will be a number of changes made before the regulations are promulgated as a result of the developments of the conferences.

The work of air registration and aircraft inspection, as discussed during the series of conferences will be divided into four classes, which are as follows: Registration and inspection of commercial or industrial aircraft; licensing of pilots and mechanics; rating of air navigation facilities; and the formulation of air traffic rules. The registration of aircraft will be divided into three classes, namely, privately owned aircraft that will engage in no commercial work, industrial aircraft, and transport aircraft. These planes will be subjected to inspection from time to time, regardless of the annual inspections contemplated. The license of a pilot will be good until revoked for cause, subject to semi-annual physical examinations and minimum flying requirements, while the licenses for aircraft will remain in force for a period of one year. No pilot will be permitted to operate a plane in interstate commerce or fly a registered plane without first being licensed by the Department. He will be given a physical and professional examination before the license is issued.

The enthusiasm shown at the series of conferences held in Washington has been pleasing to the aeronautical branch of the Department of Commerce, according to Mr. MacCracken.

Among the prominent air officials that have attended these conferences are the following:

S. S. Bradley, manager of the Aeronautical Chamber of Commerce; Professor Alexander Klemin, Daniel Guggenheimer School of Aeronautics of the New York University; William B. Stout of the Ford Motor Company; Thomas Huff of the Huff Daland Airplane Company; T. N. Joyce, Curtiss Aeroplane and Motor Corp.; Thomas M. Simpson of the Continental Motor Corp.; Charles Lawrence of the Wright Aeronautical Corp.; Charles S. Jones of the Curtiss Flying Service; L. C. Milburn of the Glenn L. Martin Co.; A. J. Elias of the G. Elias and Brothers; C. J. Brukner of the Advance Aircraft Co.

F. H. Russell of the Curtiss Aeroplane and Motor Corp.; Harold L. Harris of the Huff Daland Dusters, Inc.; Reed M. Chambers of the Florida Airways Corp.; L. D. Seymour of National Air Transport; Major General John F. O'Ryan of the Colonial Air Transport; Charles H. Colvin of the Pioneer Instrument Co.; Floyd J. Logan, prominent air supplies dealer of Cleveland; Lieut. Comdr. R. D. Kirkpatrick, U.S.N.; E. J. Sweeney of the Sweeney Aviation School; C. B. D. Collyer, Skywriting Corporation of America; William D. Tipton, Aviation Editor of the Baltimore Sun; C. J. Peterson, Wright Aeronautical Corp.; William B. Robertson of the Robertson Aircraft Corporation; J. G. Baukat of the Traveler Insurance Co.; H. Barber of the Independence Fire and Indemnity Insurance Co.; R. Sandford Saltus, Jr.; R. P. Hewitt and Thomas Carroll of the N.A.C.A.

As a result of these conferences, from which there has been gathered a mass of opinion, advise, and information, a new draft of the proposed regulations is being prepared and will shortly be published.

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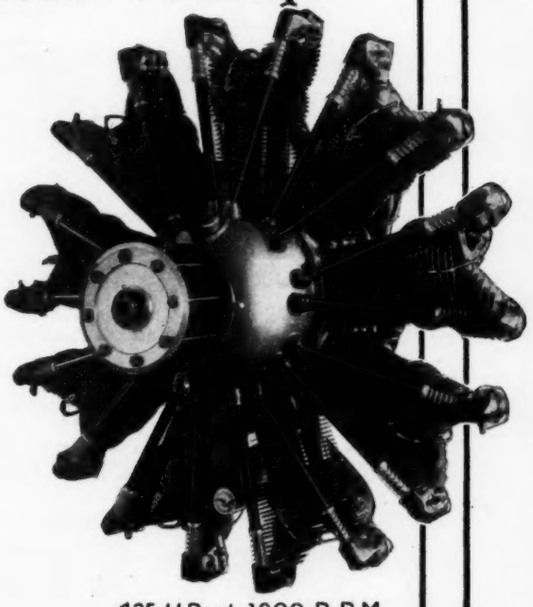

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AIRPORTS AND AIRWAYS

Boston, Mass.

By Daniel Rochford

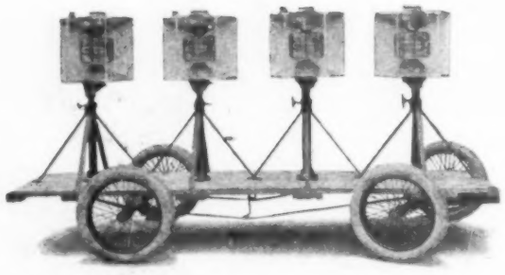
The first combined aerial demonstration of all planes based at Boston was held on Navy Day, Oct. 27 with nineteen planes participating. The New England Air Corps Reserve Officers Association organized the aerial ceremonies. The formation was led by three Navy Voughts. Lieut. W. C. Green piloted the lead plane accompanied by Lieut. Daniel Rochford, chairman of the demonstration committee. Capt. Horace N. Heisen commanded the regular army, reserve and National Guard planes in the flight. Three commercial planes, two of the Boston Airport Corporation and one of Colonial Air Transport, Inc., participated.

The fliers circled over Boston and the Massachusetts State House and then over the Navy Yard, twice in formation and once in file. Governor Alvan T. Fuller reviewed the air parade for the State and Rear Admiral Philip Andrews and his guests at the Charlestown Navy Yard reviewed it for the Navy. On the last trip around Flight Sergeant Richard Cobb, piloting a De Haviland developed motor trouble through the giving of his vertical drive shaft over Boston and glided to the only possible landing place near by, the Charles River Basin. He squashed and made a pretty pan cake onto the water and the weight of the motor pulled the plane up on its nose in the shallow water. Both Cobb and Priv. W. C. Ritterson, who was with him as passenger, climbed onto the upper wing rear edge and waited, grinning, until police boats took them ashore. Public interest ran high and as usual some of the local newspapers grossly exaggerated the accident, one paper having the fliers "crash from 500 ft., plunge under the surface, swim for the plane, and cling until rescued." As a matter of fact the plane nosed over so slowly that both men had time to get onto the wing without getting wet. Cobb did get his feet wet. But that was all. The plane was put on a lighter and hauled back to the airport where it was soon replaced in flying condition.

At Massachusetts Institute of Technology experiments on a model De Haviland in the large wind tunnel have already shown that by reshaping the fuselage to a rounded form the speed can be stepped up 19 m.p.h. The aeronautical department is more active this year than ever before. Interesting new engine experiments on the effect of super chargers at sea level are being carried on with hope for conclusions by the first of the year. The winter course of instruction for the naval reserve ground class will begin after the middle of the year.

Anthony G. H. Fokker addressed the Boston Chamber of Commerce at a noon-time luncheon Thursday, Oct. 28. He said that commercial aviation will develop with increased production because costs of motor and plane manufacture will be cut tremendously and planes now selling at prohibitive prices will be made available for perhaps fifty per cent less money than the present price.

The past week Army pilots totalled 35 hr., the Navy 38 hr., and the National Guard 13 hr. local time.



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IN CHICAGO

YACKEY SERVICE

Yackey Aircraft Co.
Checkerboard Field
Forest Park, Ill.

Distributors RYAN M-1 Monoplanes

Chicago, Aug. 4. From out of the West three hungry aviators winged across a cloudy sky, landed, taxied to the hangar and climbed out. It was Checkerboard Field, Forest Park.

"Want to make Detroit by sundown, haven't eaten since breakfast, can you fix us up?"

"Sure, what kind of gas do you use?" "Okeh" "See that new Ford coupe? Drive a half mile down the road, turn to your right, eat and hurry back."

Forty minutes later three cheerful aviators stepped into a monoplane and headed for Detroit, they arrived on time. The forty minutes the plane had been on Yackey's field it had been filled with gas, oil checked, wheels greased and cowling cleaned.

This is YACKEY SERVICE.

—Reprint.

Yackey service is complete, with expert welding, covering, or any kind of repair to plane or motor. Sudden service at reasonable rates.

RYAN AIRLINES

SAN DIEGO, CALIF.

Memphis, Mo.

By Lee R. Briggs

Aviation in this community is kept alive by the constant flying from our municipal field, located only one and a half miles from town. The old-timer, who has insisted on "keeping one foot on the ground" is beginning to discuss aviation from an intelligent point of view and some have taken hops or cross-country trips. There is no doubt that by next spring regular passenger service will be inaugurated to adjoining towns and connected up with the larger routes which will be scheduled on all air mail lines.

"Bobby" Jewell and Forest O'Brine dropped in some time ago in a Canuck, which they traded for a Ford coupe before leaving town. They are going South with the ducks for the winter. Leslie Smith, of Springfield, Ill., has been here some time with his short wing Standard, visiting his parents. He and Lee R. Briggs flew out to Wichita to inspect the airplane factories there. An active business is in evidence in both the Swallow and Travel Air factories. Quite a few planes are being built and they will be delivered as soon as they can be flown.

Edward Bodeker is working up solo time by doing most of his flying for our county fairs. This is a good way to spread the gospel of aviation. Sidney Fowler, of Keesauqua, Ia., is soloing now and will soon be ready for his F.A.I. test. James Imus, of Everett, Wash., is about ready to solo.

F. D. (Chief) Bowhan of the Swallow Airplane Co., dropped in at our field with a new Swallow a few days ago. He was assisting W. B. Rothwell, the new Swallow dealer of Davenport, Ia., in getting the plane home. They were accompanied by J. L. Kelley, who will be interested in the Davenport agency. The chief gave us a good exhibition of the fine flying qualities of the new Swallow.

There is a record of 140 flying hours on one of the motors at our field, an OX-5. It has not even had a top overhaul and is still reving up good. Who has a better record? This motor had had over 200 hr. before being installed in this plane, last March.

McKeesport Airport, Pittsburgh

By Russell J. Brinkley

The McKeesport Y.M.C.A., a sub-broadcasting station of station KDKA, has adopted a novel idea to stimulate interest in model building and the study of practical aeronautics for boys. Two classes of boys, below high school and of high school age have been formed and a plane of Thompson acrobatic type has been removed from the field at Dravosburg and assembled, with motor, in the boys' department. Thousands of people have visited the "Y" to inspect the plane and a large number of students have been signed up for regular courses in flying and ground work, by officials at the airport, due to the interest stimulated by the exhibition of this plane. The instructors are Gen. Dean Ivan Lamb and Russell J. Brinkley, of the Pittsburgh-McKeesport Airport.

Ten local aviation authorities attended a banquet held in honor of General Lamb at the Penn McKee Hotel recently. General Lamb, as chief speaker of the evening entertained his friends with a story of his flying adventures in Latin-America. The following were present at the banquet: General Lamb, D. Barr Peat, "Curley" Lovejoy, Clifford Ball, Robert Parker, Charles Carter, Robert McCaw, Merle Multrop, C. A. Peat, Russell J. Brinkley. Special guests from other cities were W. R. Yahner of Pittsburgh and John Harrington of Youngstown, Ohio.

General Lamb, who is well-known in aeronautical circles in North and South America, has become associated with the Lovejoy Aviation School. The school is to be greatly expanded during the winter months and General Lamb will have charge of the ground school, which has been recently added, in addition to his regular air work. Approximately twenty-five new students have enrolled for the course.

Pilot Merle Multrop made a special night flight on Sunday

MARTINSYDE FLYING EQUIPMENT

FOR SALE

Two Martinsyde five-place planes, one open and one cabin job, powered with Rolls-Royce Falcon motors of 260 H.P.; in perfect physical and mechanical condition, together with a large quantity of extra material, including spare engine, two sets pontoons, extra radiators, propellers, tail assembly, and numerous parts, instruments, and accessories.

Ready for immediate use, and offering an opportunity to equip a flying field, cross country service, air-line or Air Mail feeder line at minimum expense. Originally built for London-Paris service. Excellent performance; best construction; ships have been well cared for. Offered for sale following replacement with Pitcairn planes. Price includes the complete equipment.

Landing speed is slower and take-off quicker than JN.

Speed 40 to 120 m.p.h.

Cruising speed 100 m.p.h.

The price asked is less than 10% of the original value of the equipment

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Our manufacturing operations are growing, requiring room and money. Our stock of material is unusually heavy. We've determined to reduce stock, and to do so quickly, we've put on prices that must move goods that you know are reliable. Satisfaction guaranteed. It will pay you to buy now for future needs.

Act Quickly! All Offers are Subject to Prior Sale. Wire!

ENGINES

1 OX-5 Brand new (in original box)	$400.00
1 Liberty 12, just off the block test, perfect condition	800.00
1 Liberty 6, 200 H. P., Delco ignition, complete	250.00
2 Hisso Model A, ready to put in planes, each	250.00
1 Hall-Scott A5 6 cyl. complete less hub	150.00
3 OX-2's as received from the government, each	100.00
5 LeRhone 80 H.P., brand new with spares and tools	75.00

AIRPLANE WHEELS

28 x 4 brand new latest specification straight side drop center wheel, each (Note: 28 x 4, 30 x 5, or 32 x 6 tires fit on this wheel)	$21.50
700 x 100 Wheels, width of hub 7" x 9/16" axle	2.50
750 x 125 Wheels, width of hub 7¼" x 1¾" axle	7.50
750 x 125 Wheels, width of hub 7¼" x 2 3-16 axle	7.50
26 x 3 Navy spec. straight side 7¼" x 2¼" axle	15.00

AIRPLANES

1 Driggs-Johnson racing light monoplane, complete, ready to fly	$750.00
1 D. H. Dual control, seats 5 people; latest improved Liberty 12 motor	2000.00
1 3-place Hartzell; won 1st at St. Louis and Dayton races	900.00

INSTRUMENTS AND EQUIPMENT

50 New N. C. R. chronometric tachometers with 7½' or 8' shafts, each	£15.00
10 Lots of repairable instruments consisting of tachometer, altimeter, air speed compass, gas gauge, each lot	1.00
40 Sets A. S. spec. Navigation Lights, red-white-green, per set	9.00
20 Sets Aluminum streamline navigation lights, per set	5.00
20 New specification Safety Belts, each	5.50
20 Used specification Safety Belts, each	2.00
25 New Leather Map Cases; a useful present to any pilot, each	1.50

ENGINE SPARES

1 Lot of over 500 new spares for Anzani 45 and 90 H. P. For the lot	$25.00
1 Lot of over 200 new spares for Beardmore 160 H.P. For the lot	100.00
1 Lot of over 500 new spares for LeRhone 80 and 120 H. P. for the lot	25.00
50 New propellor hubs for OX-5, less bolts, each	1.00

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23 x 3 New clincher, each	$2.00
26 x 3 New mfg. A. S. Spec. each	12.00
700 x 100 New clincher, each	3.00
750 x 125 New mfg. A. S. Spec., each	18.00
750 x 125 Slightly used	7.50
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32 x 6 New mfg. A. S. Spec., straight side, each	20.00
36 x 8 New mfg. Navy Spec., straight side, each	15.00
900 x 200 new mfg. Clincher	12.00
(New inner tubes for above always carried in stock)	

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Johnson Airplane & Supply Company

DAYTON OHIO

900 South Ludlow

night, carrying as passenger W. R. Yahner, a newspaper reporter. The plane flew around Pittsburgh, McKeesport and nearby cities.

D. Barr Peat, manager of the field, left last night for Washington to confer with aviation officials concerning air maneuvers to be held at this field in the early part of November.

Pilot Basham, a Swallow agent from Muncie, Ind., flying a Waco, enroute to New York, landed at the airport early today for gasoline and oil.

Major H. W. Lake, Commander of the Sixth Corps Area, Selfridge Field, dropped into the airport on last Sunday with a Curtiss pursuit. Major Lake was accompanied by three other pursuit planes, which did not land, but went on to Selfridge from Washington. Major Lake expressed a fine opinion of the location and condition of the field and stated that in the future, planes operating between Washington and Selfridge Field would be routed by the way of McKeesport.

Stinson-Detroiter First to Reach Miami

When word of the Florida hurricane reached Atlanta, the Stinson-Detroiter, the first of three to be delivered to the Florida Airways, for use in air mail service between Jacksonville and Atlanta, left the latter city for Miami immediately with a shipment of $2,000,000 in currency. It was the first vehicle to enter Miami after the storm.

Two federal representatives were placed on board to guard the money, and Potter, the chief pilot of the Florida Airways, was sworn in as a special deputy. The plane also carried two newspaper men.

After delivering its cargo, the plane left Miami the same day and returned to Tampa, flying 1180 mi. in one day, and carrying the largest cargo of cash ever shipped by air. The Wright Whirlwind was the engine used in the plane.

Chicago, Ill.

By Otto Klein

The Associated Chicago Aviators beg to announce the birth of a new baby, an organization that is to consist of only those actually engaged in aeronautics. Up to this writing, the new baby has not been named, but its god-father, Michael M. Rubner, will undoubtedly find a suitable non-de-plume for it. Until the day the baby learns to speak for itself, Mr. Rubner will do all the talking in its behalf.

Mother Dearborn has been very successful in the past in singing her babies to sleep, but contrary to maternal practice, the new baby will not be exposed to any such lullabies. The baby's foster parents, a committee of five, made their first appearance at a meeting of the Chicago Aero Commission, Oct. 22, in order to bring before the commission the commercial aviator's viewpoint of what is needed to make Chicago a greater airport. These needs, boiled down, are: the lake front landing field and the Lincoln Park lake front field must be made available as quickly as possible; the newspapers of Chicago must discontinue giving all bad news front page publicity and must give more publicity to the favorable news, of which little is ever said. It is hoped that the newspaper representatives present took notice.

The Chicago Flying Club has brought out its first "Kingbird." It is a four-place OX-5 job, with dual control side-by-side in the rear cockpit. The wings are on the order of an Eaglerock, the lower panels extending beyond the uppers. This is due to the upper wings being hinged together without center section, thus shortening the span. The fuselage of the new plane is painted black, the wings orange, which makes a pleasing combination. So far the plane has not been flown.

The Heath Airplane Company is enjoying one of its best months of the year. It now has approximately 40 students, operating both day and night classes. Much of this student business is due to a new arrangement the company has

FOR SALE

Special custom-built biplane

FLYING BOAT

with mahogany hull

420 h.p. Special Packard Engine

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Oklahoma and Texas Panhandle–Tibbs Flying School, Oklahoma City
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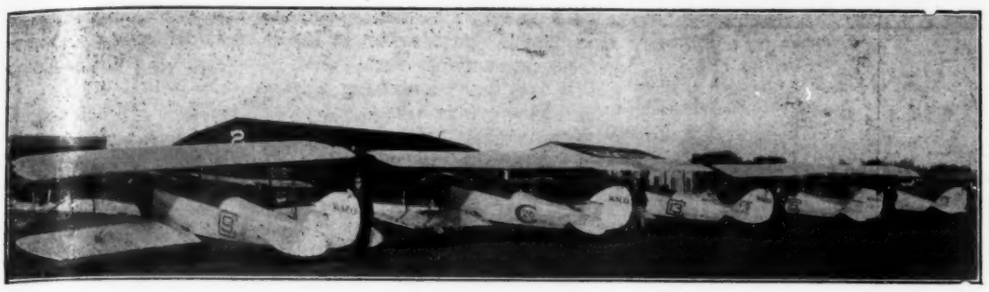

Commercial airplane (Waco 9's) of the New England Aircraft Co..

adopted, by which a student is furnished employment in whatever line of work for which he is best fitted, giving him sufficient salary to cover his living expenses and the cost of the course. The student can thus work his way through school, and it is no longer necessary to have a large amount of cash to get into the game. Mr. Edwin Baumgarth is in charge of the student and employment department.

New England Aircraft, Co. Trains Many Students

Activities at the New England Aircraft Co., Inc., continue to increase. With thirty-eight students enrolled, of whom twenty-five are at present taking the course, the school looks for an exceptional season. Six students have soloed and four more are ready to finish their work.

Seven planes have recently been sold and financial conditions are such that a capital increase and an expansion of activities are planned during the winter.

Commutes by Plane

H. W. Plimpton, of Boston, Mass., is a pioneer air commutor. In order to attend his business at Norwood, Mass., where he is head of the Holliston Mills, Inc., he built a hangar to house his plane, and flies between Boston and Norwood twice daily.

United States Air Forces

Anti-Aircraft Fire Control Perfected

The combined Ordnance and Coast Artillery tests of new anti-aricraft material at the Aberdeen Proving Grounds have now reached their final stages and many of the new articles of equipment have proved highly satisfactory. One of these is the new fire-control instrument for the use of the larger calibre guns against aircraft.

This instrument is so designed that, given the altitude of the plane, which is easily determined, the only action required is for one observer to follow the target's elevation and another to follow its direction, both through telescopes mounted on the instrument. The movements of these two telescopes control a mechanism which transmits electrically all firing data to the gun or guns. The data comprise the elevation and direction to be given the gun, so that the shell fired will intersect the path of the plane. The same instrument mechanically indicates the exact fuse setting that will explode the shell at the moment it reaches the point of intersection of the course of the plane and shell.

This fire-control instrument mechanically moves pointers

The Loening Amphibian

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The way in which this modern design of plane has come to be accepted by the Services and put to use in Alaska, in the Tropics, with the Flect, and in our overseas possessions, is a great tribute to the correctness of its fundamental design. And the practical day-in day-out hard working service that these planes are giving is the achievement only of a painstaking consistent effort combined with a talented skill in manufacturing.

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CHARLES GREY
Editor

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on the gun and on the fuse-setting machine. All that is required of the gun crew is to keep the gun set at the elevation and direction automatically indicated and to feed the ammunition into the fuse-setting machine and from there into the gun. The gun is a semi-automatic loader which has reached a rate of fire of 27 shots per minute.

Air Corps Materiel Division to McCook Field

The War Department has approved the establishment at McCook Field, Dayton, Ohio, of the Air Corps Materiel Division, under the command of Brigadier General William E. Gillmore.

General Gillmore, who has, since the World War, been Chief of the Supply Division in the office of the Chief of Air Corps, Washington, will establish his headquarters temporarily at McCook Field and upon completion of facilities at Wright Field near Dayton will move to that station.

The new Materiel Division will consolidate under one head all the activities now carried on by the Engineering, the Supply and the Industrial Planning Divisions of the Air Corps. Located at the Air Corps Experimental and Engineering Laboratories and within a few miles of the aviation supply depot at Fairfield, the chief of the division will be able to exercise close supervision over these and there will be immediately available to him expert technical advice on all phases of his work.

While the details of administration are not yet complete, the functions of the Materiel Division will include experimental engineering, procurement of equipment, maintenance of equipment and industrial planning.

This reorganization will result in greater efficiency within the Air Corps and a considerable saving in expenditures. It will also relieve the Chief of Air Corps of a great amount of detail work and thereby enable him to concentrate on the military activities of the Corps. However, he will continue to exercise general supervision over the Materiel Division through a small section in his Washington office.

Airplanes for Gunnery Practice

Four special DH4M-2 airplanes are being remodeled at the Repair Depot, Fairfield Intermediate Depot, for use in aerial gunnery projects. Complete sets of the latest types of radio receiving and sending equipment will be installed, together with approved devices for towing targets through the air. Inasmuch as these gunnery tests will probably be made at night, the airplanes will be equipped with night-flying apparatus. Instead of the old wind-driven generator, an electric motor-driven generator is now used. The radio set is known as the SCR-134. Either telegraphic signals or the voice may be used for both sending and receiving.

Five thousand feet of steel cable are carried on the tow target reel. The wind pressure, acting on the target, carries it any desired distance up to the limit imposed by the length of the cable. The letting-out of the target is controlled by a brake drum. When the target cable is wound up, a foot-operated clutch is used, the power being obtained from a small wind-driven propeller. These four specially equipped airplanes when completed will be flown to Phillips Field, Aberdeen, Md., where the gunnery work will be undertaken in connection with other ordnance projects at the Aberdeen Proving Grounds.

Aerial Targets Wanted

The Army's recent tests of anti-aircraft guns and ammunition at Aberdeen Proving Grounds have been considerably handicapped by inability to secure an aerial target which could be seen at the ranges at which it is desired to make tests. The new guns and ammunition have shown such advance in accuracy and speed of fire that several tests have been interrupted because of the fact that at the ranges at which it has been possible to see the target, the target has been shot away before completion of the full run. Efforts are now being made to secure a target that can be towed by an airplane and still be visible at the effective range of the gun. Firings have been conducted with the target at from 4,000 to 5,000 yds. range and 7,000 to 9,000 ft. altitude. It is possible from this firing to estimate the effectiveness of fire at 6,000 or 7,000

yds. range and 10,000 to 12,000 ft. altitude, but estimates so made are not as satisfactory to those concerned as would be firing at an actual target at such ranges and at such altitudes.

A Prohibition Air Fleet

A prohibition air fleet has recently begun operations in the New Jersey area. The military hangars at Cape May have been taken over to house planes and an aviation unit consisting of two officers and six men, all qualified fliers, has been placed at the service of Comdr. E. S. Addison, Coast Guard Base 9, at Cape May, N. J.

Three seaplanes constitute the fleet. The fleet will operate in the territory between New London and Norfolk. Two planes will be constantly in use and the third held in service. Capt. Walter F. Anderson and Chief Gunner Charles T. Thrum will pilot the planes. Both men saw service in the World War.

New Naval Non-Rigid at Lakehurst

Utilizing parts from various sources, the Naval Air Station at Lakehurst has assembled a non-rigid airship, the J-3, for training and experimental purposes in order to lighten the work of the rigid airship Los Angeles. The new ship has made a satisfactory test flight under the command of Lieut. Clinton H. Havill, U.S.N. and now occupies a berth in the Lakehurst hangar alongside the Los Angeles.

The car and engines for the new airship were purchased from the Army Air Corps, the envelope from the Goodyear Tire and Rubber Company of Akron, O., and the control surfaces were made at the Naval Aircraft Factory, Philadelphia.

The J-3 has two Wright I-type engines and a cruising radius of 1,000 miles. Her gas capacity is 220,000 cu. ft., about one-tenth that of her hangar-mate.

This test flight of the J-3 was the first non-rigid flight the Navy has undertaken since the J-1 was deflated in 1924 in order to provide helium for the trans-Continental trip of the Shenandoah.

Navy Day at Lakehurst

More than 5,000 persons visited the Lakehurst Naval Air Station on Oct. 27, to witness the many events the officers had prepared in observance of Navy Day. The airship Los Angeles was in the hangar and many of the visitors had a close-up view of the ship.

The non-rigid ship J-3, piloted by Lieut. C. H. Havill, left the field in the morning for a trip to Philadelphia over the Sesqui-Centennial grounds. Upon its return, it made several trips about the field with student officers. During one of these trips, Alva F. Starr, aviation chief rigger, made a "free" fall with a parachute from an altitude of 2,000 ft.

A Navy T-D plane, piloted by Lieut. Delong Mills, was engaged all day in carrying the members of a parachute class. Lieut. T. G. W. Settle, engineer officer of the Los Angeles, was one of several who made a successful jump from the plane.

The kite balloon was on the field during the day and attracted much attention.

Comdr. E. E. Stone Returns to Coast Guard

Naval Aviation has lost a veteran aeronautical expert in the transfer back to the Coast Guard of Comdr. Elmer E. Stone, U.S.C.G., whose loss will be hard to replace. For the past seven years Commander Stone has been on duty in naval aviation and for some time past has been in the design section in charge of launching and arresting gear for aircraft carriers, a development in which the American Navy leads the world.

From time to time the "loan" of Commander Stone has been extended and it had been hoped that arrangements could be made for the Navy to retain his services permanently. Recently, however the Coast Guard found his services imperative on important work and the Bureau of Aeronautics was forced to surrender him.

Lieut. Doolittle with Lap Pack type; Lieut. Brookley, with Seat Pack type — IRVIN Air Chutes.

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They think nothing about it now. These men of the Army Air Service. They step easily into their "IRVIN" harness before going up. And then as they sit comfortably with the "pack" attached, they forget it entirely. Yet it's ready for instant use—if they need, or want it. And it gives them that confident feeling of "ready for anything". Likewise with the U. S. Navy and U. S. Air Mail services.

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Record Target Shots

After making 86 hits on a sleeve target, one of the highest scores in aviation record for individual machine gun practice, Lieut. J. F. Gillon, U.S.N., attached to Scouting Plane Squadron No. 1, Atlantic Fleet, was sent up by umpires for another run on the target because he was judged within the minimum range allowed for the practice. On the second run, with the range carefully measured, Lieutenant Gillon sent 92 bullets through the sleeve in one burst.

Pan-American Flight

Capt. Wolcott P. Haynes, first advance officer of the Pan-American Flight to depart on his mission, sailed from New York City, on Oct. 16, for Pointe a Pitre, Island of Guadeloupe, one of the stops in the fifth division of the flight route. The fifth division includes stops at St. George, Island of Granada, Kingstown, Island of St. Vincent, Fort de France, Island of Martinique, and Pointe a Pitre, Island of Guadeloupe.

Captain Haynes has in the past spent considerable time at various points in the Leeward and Windward Islands. He will return to the United States in sufficient time to impart the result of his investigations before the flight starts from Kelly Field, about Dec. 15.

Torpedo and Bombing Plane Squadron One

Typical of the amount of naval flying which is continually going on is the achievement of the Torpedo and Bombing Plane, Squadron One, of the Aircraft Squadrons, Scouting Fleet, during the past eleven months. During the Winter maneuvers at Guantanamo, four months of operation at Hampton Roads and the Summer maneuvers at Newport, each plane completed over 250 hr. of service, with six averaging 280 hr. flying duty.

The total mileage covered by these planes was approximately 216,000, without a single forced landing though operating under severe conditions. Squadron One is under command of Lieut. Comdr. E. W. Spencer, jr.

Films Earth from Parachute

James Clark, parachute jumper at the Naval Air Station at Anacostia, D. C., filmed the landscape while descending by parachute from an airplane on Oct. 27.

With an automatic motion picture camera strapped to his chest, Clark made a descent of several thousand feet. The first few hundred feet of the jump consisted of a series of irregular somersaults, but the latter part of it was more evenly and less rapidly regulated.

Pensacola Repairs Damage

The Naval Air Station, Pensacola, Fla., which was recently visited by a hurricane, causing a considerable amount of damage, has been busily engaged in determining the extent of damage done, and making record photographs of the damage inflicted.

The Radio Laboratory has been engaged in cleaning and salvaging apparatus and parts. The Photographic Department has been busy in not only taking views about the station, but has also been repairing damage to photographic equipment. The roof of the photographic laboratory has been entirely re-covered by personnel of the section. The Ordnance Department has also been engaged in overhauling all ordnance equipment, while the Assembly and Repair Department as well as the Engineer's Division have been overhauling planes and engines damaged by the storm.

During the week ending Oct. 2, there were no training flights made. Flights consisted chiefly of photographic, material test and administrative flights, all tending to get the planes in shape to resume training again as soon as possible.

Army Air Orders

Sec. Lieut. Elmer Florance Knight, Air Corps Res., Brooks Field, to New York City, and on arrival will stand relieved from active duty.

First Lieut. Benjamin F. Griffin, Air Corps, St. Louis, to Langley Field.

The resignation by First Lieut. Corliss Champion Moseley, Air Corps, of his commission as an officer, accepted.

First Serg. William Frey, Air Corps, France Field, placed upon the retired list and sent to his home.

First Lieut. Henry Leighton Bangs, Air Corps Res., Detroit, Mich., to active duty and will report to Air Corps procurement planning representative, Detroit, for training, reverting to inactive status Nov. 21.

Capt. Geary John Stuart, Air Corps Res., Charleston, Ore., to San Francisco, reverting to inactive status Nov. 19.

Sec. Lieut. Gustaf Thorsten Lindstrom, Air Corps Res., Buffalo, to report for active duty to the Air Corps procurement planning representative, Buffalo, reverting to inactive status Nov. 22.

Major Charles Martin Newbauer, Air Corps Res., New York City, to Washington, reverting to inactive status Nov. 14.

Sec. Lieut. Remsen Taylor Andersen, Air Corps Res., San Francisco, to active duty Air Corps procurement planning representative, San Francisco, reverting to inactive status Nov. 21.

Sec. Lieut. Paul Hanes Kemmer, Air Corps Res., promoted to rank of First Lieutenant.

Staff Serg. Fred Simms, Air Corps, Brooks Field, to Bolling Field.

Staff Serg. Joseph E. Salter, Air Corps, Bolling Field, to Brooks Field.

First Lieut. Harold R. Wells, Air Corps, Mitchel Field, to New York City, sailing March 8 for Philippine Islands.

Following officers, Air Corps, assigned as indicated, to take effect upon completion of tour of foreign service: Capt. Aubrey I. Eagle, Fort Sam Houston, First Lieut. Frederick Von H. Kimble, Selfridge Field, First Lieut. Arthur Thomas, Fort Sam Houston, and Second Lieut. James W. Spry, Fort Crockett.

First Lieut. Edmund C. Langmead, Air Corps, to Fort Sam Houston, effective upon completion of tour of foreign service.

Capt. George L. Usher, Air Corps, New York City, to sail March 8 via government transportation for Philippine Islands.

Capt. Clinton F. Woolsey, Air Corps, McCook Field, to New York City, sailing March 8, via government transportation for the Hawaiian Dept.

First Lieuts. Elmer D. Perrin, Air Corps, Brooks Field and Park Holland, Air Corps, Kelly Field, to San Francisco, sailing March 27 for Philippine Islands.

First Lieut. Earle H. Tonkin, Air Corps, Washington, to McCook Field.

Brigadier General William E. Gillmore, Washington, to McCook Field.

Capt. Albert W. Stevens, Air Corps, Fairfield, to McCook Field.

First Lieut. Winfield S. Hamlin, Air Corps, Fairfield, will assume command of 7th Photo Sec. at that depot.

Navy Air Orders

Lieut. James P. Compton to temp. duty Nav. Air Sta. Pensacola. This modifies orders Oct. 1.

Comdr. Sydney M. Kraus det. Nav. Air Sta., Lakehurst, to Bur. Aero.

Lieut. Loverne A. Pope det. Nav. Air Sta., Pensacola, to U.S.S. Milwaukee.

Lieut. (jg) Clifton A. Young det. Nav. Hosp., Boston, to Aircraft Sodns., Sctg. Flt.

Comdr. Garland Fulton det. Nav. Air Sta., Lakehurst, to Bur. Aeron.

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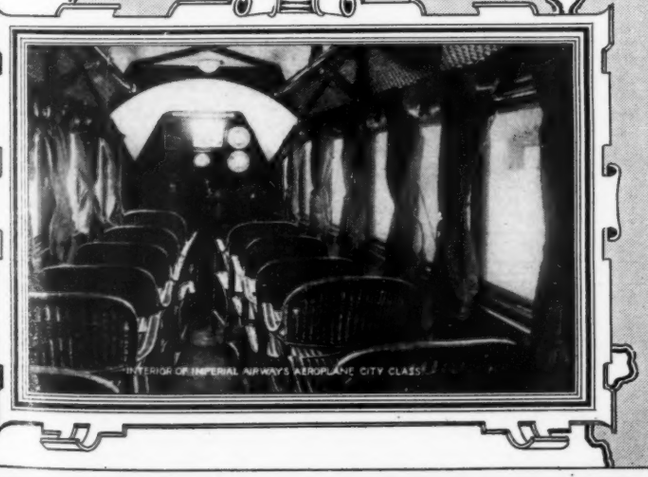

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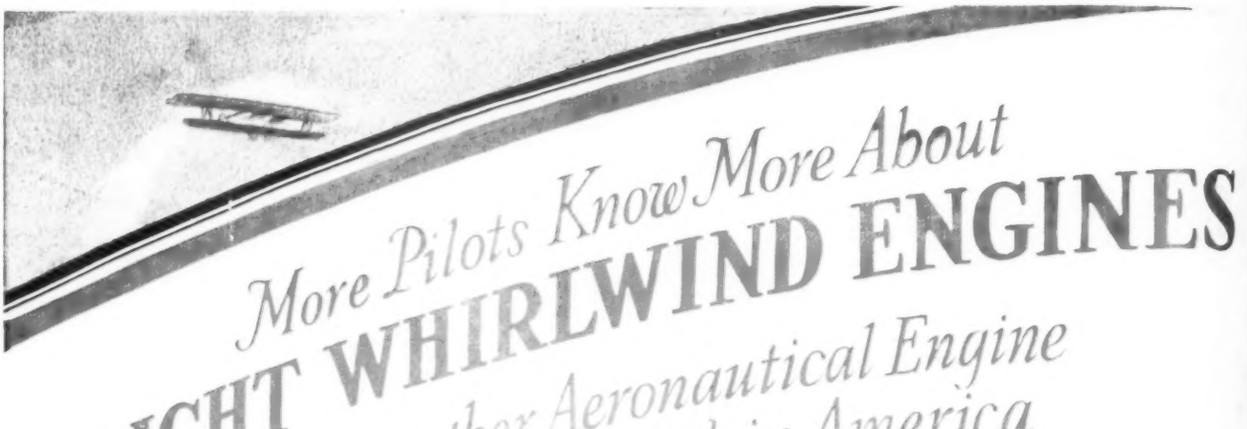

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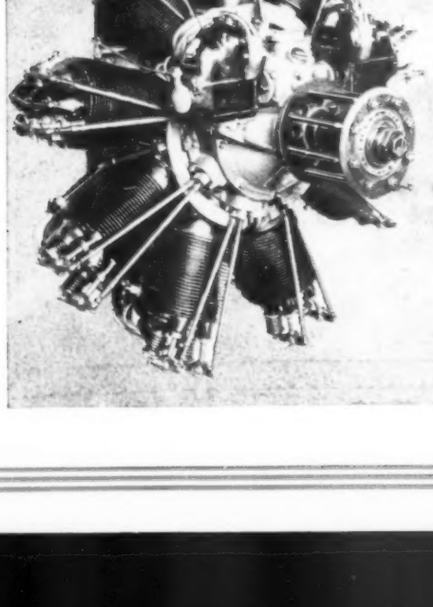

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